# RELATIONSHIP BETWEEN INCREASING AGE AND VARIATION OF ACTIVE RANGE OF MOTION OF LUMBAR SPINE (SAGITTAL PLANE) FOR THE PATIENTS WITH CHRONIC LOW BACK PAIN ATTENDED AT CRP

**Punam D Costa**

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

Session: 2007-2008

BHPI, CRP, Savar, Dhaka

**Bangladesh Health Professions Institute (BHPI)**

Department of Physiotherapy

CRP, Savar, Dhaka-1343

Bangladesh

February, 2013

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

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

…….
**Nasirul Islam**
B. Sc. PT (Hons.), MPH
Assistant professor of Physiotherapy
Course Coordinator, M. Sc. in Physiotherapy Program
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka
Supervisor

……..
**Mohammad Anwar Hossain**
B. Sc. PT (Hons.), Dip. Ortho. Med, MPH
Associate Professor of Physiotherapy, BHPI &
Head of the Department of Physiotherapy
CRP, Savar, Dhaka

……
**Muhammad Millat Hossain**
B. Sc. PT (Hons.),
Lecturer
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……..
**Md. Shofiqul Islam**
B. Sc. PT (Hons.), MPH
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

……
**Md. Obaidul Haque**
B. Sc. PT (Hons.), Dip. Ortho. Med., MPH
Associate Professor & Head of the Department
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

# Declaration

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

**Signature:** **Date:**

**Punam D Costa**
Bachelor of Science in Physiotherapy (B. Sc. PT)
Session: 2007-2008
BHPI, CRP, Savar, Dhaka- 1343

# Contents

## Acknowledgement

I am greatly indebted to many people who have helped me in various ways by giving their constructive suggestions, supervisions and valuable time that was needed for the completion of the study. First and foremost I am intensely grateful to my honourable supervisor Nasirul Islam and my honourable class teacher Md. Shofiqul Islam for their dedicated supervision and tremendous guidance without which I could not be able to complete this study.

I also extend my sincere thanks to all the staffs of outpatient, musculoskeletal department of physiotherapy for their kind support at the time of data collection. I am also thankful to all the staffs of BHPI library for their cordial help in my study.

I am grateful to my parents who have always inspired me and provided all necessary supports. I also thank all my friends and seniors who are directly or indirectly involved with this study by giving their inspiration, suggestions and supports.

Above all I thank all the participants of the study for giving their consent and valuable time.

Last but not the least I thank God for the gift of life and all the blessings. We are what we are for his grace and blessings.

## Acronyms

| | |
|---|---|
| **ADL** | Activities of Daily Living |
| **BHPI** | Bangladesh Heath Professions Institute |
| **BMI** | Body Mass Index |
| **CLBP** | Chronic low back pain |
| **CRP** | Center for the Rehabilitation of the Paralyzed |
| **IASP** | International Association for the Study of Pain |
| **LBP** | Low back pain |
| **NSAIDS** | Non steroidal anti inflammatory drugs |
| **ROM** | Range of motion |
| **SPSS** | Statistical Package of Social Science |
| **TENS** | Tanscutaneous Electrical Nerve Stimulator |
| **USA** | United States of America |
| **UK** | United Kingdom |
| **WHO** | World Health Organization |

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## Abstract

*Purpose:* The purpose of the study was to establish the association between increasing age and variation of active range of motion (AROM) of lumbar spine (sagittal plane) for the patients with chronic low back pain (CLBP) attended at CRP. *Objective*: To find out the relationship between increasing age and variation of AROM of lumbar spine (sagittal plane) for the patients with CLBP attended at CRP. *Methodology:* Using linear regression model, correlation study was conducted with a semi structured questionnaire to collect data from 60 participants. Data were numerically coded and captured in Microsoft Excel, using an SPSS 16.0 version software program. *Results:* The study found that the coefficient correlation for active lumbar flexion is -0.06 and for active lumbar extension is -0.04. That means with increasing age, AROM of lumbar spine (sagittal plane) decreases. With one year increase in age, the active range of motion of lumbar flexion of a chronic low back pain patient decrease by 0.06 centimeter or 0.6 milimeter and the active range of motion of lumbar extension of a chronic low back pain patient decrease by 0.04 centimeter or 0.4 milimeter. The mean age of the participants is 45 (±13.37) year. About 52% participants were female and 48% participants were male. Most frequent occupation of the participants was housewife. *Conclusion:* As with one year increase in age, active flexion of lumbar spine decreases 0.06 centimeter or 0.6 milimeter and active lumbar extension decreases 0.04 centimeter or 0.4 milimeter, so strategy should be developed to maintain or restore ROM.


*Key words:* Chronic low back pain, Range of Motion, Age.

# CHAPTER-I: INTRODUCTION

## 1.1 Background

Low back pain (LBP) is a major health problem in modern society. It is one of the most common and challenging musculoskeletal problem in primary care. It is the number one most common cause of activity limitation, the second most frequent cause of doctor's visits and the third most common cause of surgical procedures in USA (Apfel et al., 2010).

It is the most common daily complaint of the adult population. In Australia about 20% of the adult population experiences LBP at any given time (Alsaadi et al., 2011). Approximately 70-85% of the population suffers LBP at some point of their lives in USA (Buselli et al., 2011). The point prevalence of LBP is 6.8% in North America, 12% in Sweden, 13.7% in Denmark, 14% in the United Kingdom, 28.4% in Canada and 33% in Belgium (Kent & Keating, 2005). The lifetime prevalence of LBP is 58% in UK and 70% in USA (Peterson et al., 2000).

Plouvier et al. (2011) mentioned that LBP is more frequent among older people and become persistent as the age increases. An updated systematic review of global prevalence of LBP showed it as a major musculoskeletal problem throughout the world and most common among females and persons ages 40–80 years (Hoy et al., 2012). It has tendency of becoming persistent or chronic that usually lead to disability. Almost 10% of all patients are at risk of developing chronic pain and disability in UK (Buselli et al., 2011).

Chronic low back pain (CLBP) is a major public health issue causing disability of the elderly (Muraki et al., 2012). It is the second most common cause of disability among US adults. The prevalence of CLBP ranges from 9% to 21% and disability among CLBP patients varies from 11% to 76%. This variation occurs due to different methods of measurement of the phenomenon. Moreover it is a compound and multifactorial phenomenon related with high social and health costs that lead to disability. The high costs are related with productivity losses, work absenteeism and health system expenses (Salvetti et al., 2012). In USA seven million adults have

activity limitations as a result of this (Jacobson et al., 2009). A study in 2003 in Netherland found that about one-fourth of the employed population took sickness leave in the past year due to this (Schimmel et al., 2009). About 5-10% of employee misses work every year in Canada due to this (Buselli et al., 2011). As a result of absence from work productivity losses as well as the health system expenses are increasing day by day.

The healthcare and social costs of LBP are increasing more quickly. The healthcare costs increased 65% between 1997 and 2005 in USA for LBP in comparison with overall healthcare costs. Now it is over 70 billion dollars per year in USA (Buselli et al., 2011). In UK it is 17 billion per year and in Australia 1 billion per year. Most of these costs are associated with CLBP (Alsaadi et al., 2011). That's why it is called disaster of the 20$^{th}$ century (Sparkes, 2005).

Age is an important predictor of LBP. The incidence and severity of spinal degeneration increase with aging. A study of Japanese women between 25–85 years of age revealed that LBP is more common among older groups (Peterson et al., 2000). Among CLBP patients bone density reduces at the lumbar spine comparing with normal population and also changes occur in the intervertebral discs. As a result incidence of osteopenia and osteoporosis increases (Park et al., 2010).

As the age advances spinal degeneration become a prevalent problem where mechanical property changes as a result of degeneration (Niosi & Oxland, 2004). The normal morphology and biochemistry of the intervertebral disc and bone undergo changes that are different from degenerative bone and disc disease leading to changes of the water and protein contents of the body's cartilage. As a result it becomes weak, thin and more fragile. Both the discs and the facet joints are partly composed of cartilage so wear and tear occurs in these areas over time (Saidu et al., 2011).

Disc degeneration decreases load transmission through the nucleus and increases load transmission through the annulus fibrosus during compression. The proportion of load transmission through the posterior elements also increases with advancing degeneration. The overall changes in motion patterns occur with increasing

degeneration (Niosi & Oxland, 2004). Moreover aging is associated with bone density loss, muscles atrophy and limitation of joint range of motion (Saidu et al., 2011).

High BMI and physical occupational exposures are the other predictors of LBP. There is a positive association between high BMI and both high intensity of LBP and disability (Park et al., 2010). Also repetitive performances of bending, twisting, manual material handling and vibration movements are risk factors of it (Plouvier et al., 2011). Heavy manual lifting is another exposure that is strongly associated with LBP (Lederman, 2011).

As a result range of motion (ROM) of lumbar spine decreases significantly with increasing age. It reduces in both male and female. ROM reduces consistently with each decade of age for all movements (Herp et al., 2000). As the age increases LBP also affects the movement of lumbar spine. Study shows that ROM of lumbar spine reduces in all direction because of LBP (Wong & Lee, 2004). Limited spinal movement may cause problem in functional skills, daily living activities such as dressing, picking up objects from the floor. It may also lead to gait abnormalities (Saidu et al., 2011). Thus, it can seriously affect the functional activities and quality of life of the patients.

## 1.2 Rationale

Low back pain is one of the most common symptoms experienced by people throughout the world. Approximately 20% of the adult population experiences LBP at any given time and lifetime prevalence of LBP is around 80%. A study about global review of the prevalence of LBP showed that point prevalence was 12%–33% and 1-year prevalence was 22%–65% among adult population in 2000. The prevalence of CLBP ranges between 9%–21% and it is more frequent among female rather than male. About 39% incidence of CLBP is discogenic whether less than 30% results from disc herniation. It is the number one factor for activity limitation in patients less than 45 years old, the second most frequent reason for doctor's visits. The prevalence of disability among CLBP patients varies between 11%–76%. The direct costs of medical care of low back pain are enormous. In Denmark it was the most common musculoskeletal problem comprised 50% of all work related disorders in 2000 and the 2$^{nd}$ most common reason for disability pension (22% of all disability pensions) in 2002. Now it is over $8 billion annually. As a result, it is referred as 20$^{th}$ century's disaster.

Aging is an ongoing natural process. Neither the effects of aging can be stopped nor can the effects be escaped. ROM of lumbar spine is expected to decrease with increasing age. With the advancement of age degeneration of the spine become a prevalent problem where bone and intervertebral disc undergo changes that results in reduced bone mineral density, muscle atrophy and limitation of joint ROM in both sexes. Degenerative changes of the spine include disc degeneration, facet joint osteoarthritis, vertebral body degeneration, ligament degeneration etc. The spine has three functional roles- load bearing, provision of movement and protection of neural elements. Disc degeneration directly affects the first two roles of the spine and indirectly affects the capability of the spine to protect the neural elements. As a result, LBP become the most common musculoskeletal complaint among older population and become persistent. The disability levels due to this tend to increase with age in both male and female.

Not only aging but also obesity, smoking, vibrations from transportation, excessive axial loads and other factors accelerate the degeneration of intervertebral discs.

Cigarette contains nicotine that reduces blood oxygen and oxygen supply to discs thus enhances disc degeneration. Forward bending produce high bending moment on the osteoligamentous lumbar spine and lifting produce high compressive force at the same time. If bending and lifting activities performed repetitively this leads to degeneration.

LBP itself is a frequent cause of reduction of the mobility of the lumbar spine that causes impairment of spinal mobility. It is the number one factor of activity limitation in patients less than 45 years old and more common in female than male. Limitation of lumbar mobility interfere with the attainment of important functional skills and activities of daily living such as dressing, picking up objects from the floor etc. Obesity associated with LBP causes hyperextension during stance phase and also affects daily movements such as standing up, walking, lateral bending and forward flexion. These forms of functional disabilities have profound effects on the quality of life. The other factors contributing to the long-term disability are age, location of symptoms, socioeconomic and psychological factors (distress, depression, beliefs, job dissatisfaction and mental stress at work).

In physiotherapy practice major percentage of patients are CLBP patients. Assessment of lumbar spine ROM is important for physical therapists and rehabilitation specialists in clinical practice to treat low back pain.

Accurate measurement of joint mobility is important to the physical therapist for assessing the lumbar spine. During examination and assessment of patients' ROM physical therapists should keep patients age in mind as an age related decrease in ROM occurs. Knowledge of lumbar ROM helps in guidelines for treatment and patient’s response to treatment.

Therefore the study will explore the relationship between age and limitation of ROM of lumbar spine. That means how much the joint ROM decrease with increasing of one year age. Also it will give details information to the patient about LBP so that people can modify their life style regarding it and we can provide better treatment as well as essential advice to the patients. As a health professional it improves our

knowledge. Research makes the profession strongest and this study will help the physical therapists to address ROM issues more comprehensively in setting up a holistic goal related to patients problem. So there is no alternative option to do research as a professional to develop the profession.

## 1.3 Research Question

What is the relation between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for the patients with chronic LBP attended at CRP?

## 1.4 Objectives

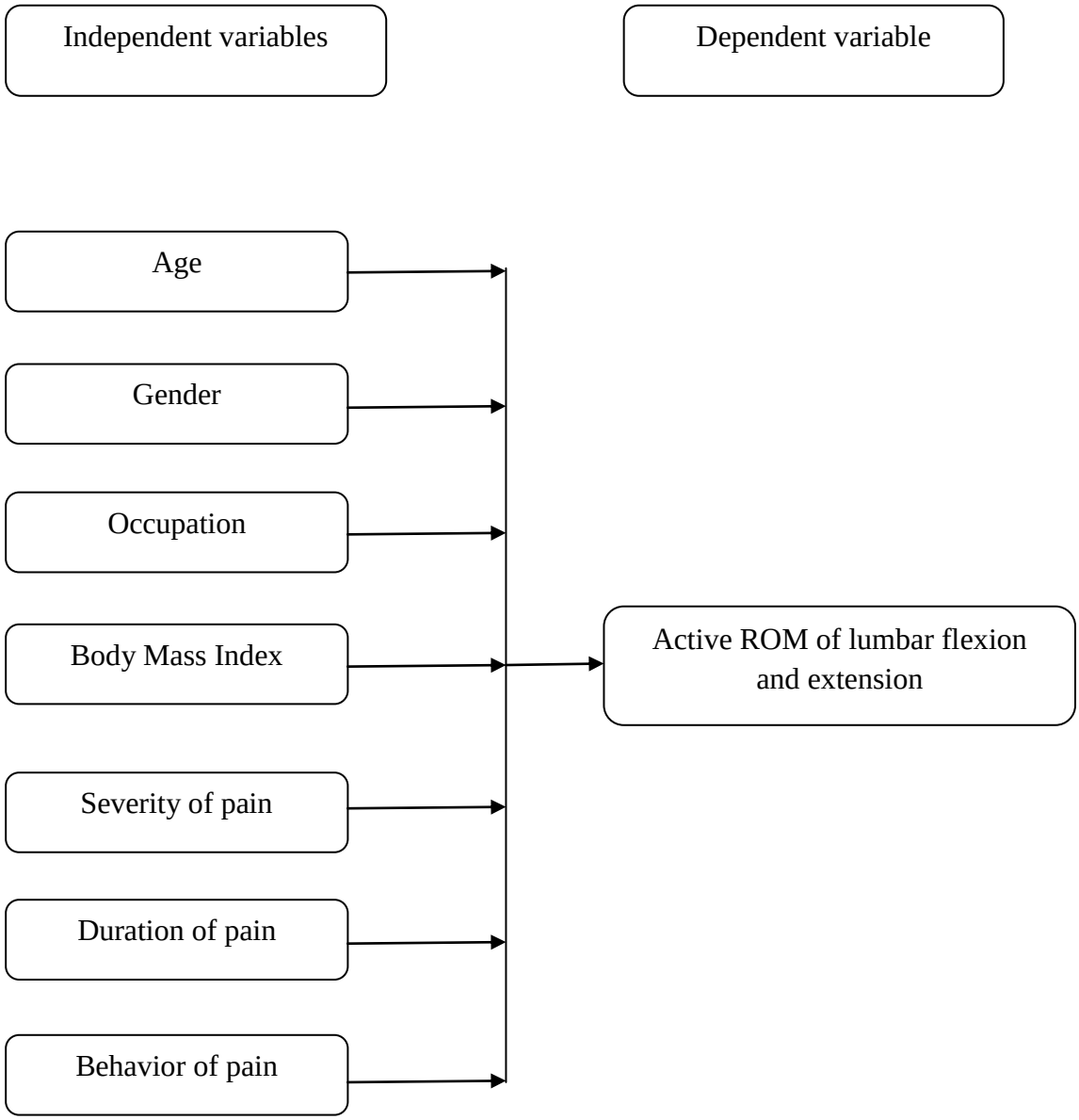
### 1.4.1 General objective

- To find out the relationship between increasing age and variation of active ROM of lumbar spine (sagittal plane) for the patients with chronic LBP attended at CRP.

### 1.4.2 Specific objectives

- To measure active flexion of lumbar spine and compare with the different ages of participants.
- To measure active extension of lumbar spine and compare with the different ages of participants.

## 1.5 Conceptual Framework



## 1.6 Operational definition

**Low back pain**

Pain in the lumbosaccral area of the spine encompassing the distance from the 1st lumbar vertebrae to the 1st sacral vertebrae (12th rib to the inferior gluteal fold).

**Chronic low back pain**

Persistent, long-lasting lower back pain continuing for more than three months.

**Range of motion**

How much a person can bend his/her trunk forward and backward actively as far as possible.

**Aging**

The process by which a person gets older.

**Duration of pain**

The length of time a person suffering from chronic low back pain.

**Severity of pain**

How much a person feel pain expressed by visual analogue scale.

# CHAPTER-II: LITERETURE REVIEW

The lumbar spine corresponds to lower back consists of five vertebrae. These vertebraes have heavy thick bodies to support the greater stress and weight as they serves as major load bearing portion of the vertebrae. There are two short stalks project posteriorly from the body and then fuse medially to form the neural arch. The vertebral foramen is located in the center of the neural arch through which the spinal cord passes. A spinous process projects posteriorly from the posterior portion of the neural arch and transverse process projects laterally from each side of the neural arch (Gunstream, 1992).

The spine is a three-joint complex at each level. This complex consists of one intervertebral disc and two facet joints. The two facet joints are plane type of synovial joints and the joint between the vertebral bodies is a symphyseal joint. The surfaces of the vertebral bodies are lined by thin layers of hyaline cartilage and between these layers the intervertebral disc is a thick plate of fibrocartilage that serves as shock absorber (Chaurasia, 2004). The disc is viscoelastic that have creep and relaxation behavior. It also helps in stress distribution and protects the vertebrae from grinding against each other (Lee, 2006). During axial compression these joints bear load and allow movement between the vertebrae.

Each intervertebral disc consists of the nucleus pulposus which is a central but slightly posterior mucoid substance embedded with reticular, collagenous fibers and surrounded by the annulus fibrosus that is a fibrocartilaginous lamina. The annulus fibrosus has three layers- the outermost, middle and innermost fibers. The anterior longitudinal ligament (ALL) strengthens the anterior fibers. The posterior longitudinal ligament (PLL) is a narrow structure that provides weak midline reinforcement especially at L4-5 and L5-S1. The anterior and middle fibers are most numerous anteriorly and laterally but less posteriorly. These fibers are firmly attached to the vertebral bodies. The symphyseal joints between the vertebral bodies provide mobility of the vertebral column and facet joints allow gliding movements. The movements of the lumbar spine are flexion, extension and lateral flexion with a minor degree of rotation (Kishner, 2012).

The ligaments of the lumbar spine are anterior longitudinal ligament (ALL), posterior longitudinal ligament (PLL), interspinous ligament, intertransverse ligament and ligamentum flavum (LF). The ALL is attached to the anterior annular fibers and covers the ventral surfaces of lumbar vertebral bodies and discs. It maintains joints stability and limit extension. The PLL is situated within the vertebral canal over the posterior surface of the vertebral bodies and discs. It limits vertebral column flexion except at the lower lumbar spine as it is narrow and weak. The interspinous ligament weakly resist flexion of the spine and intertransverse ligament resist lateral bending of the trunk. The LF forms the posterior wall of the vertebral canal by being attached with the interspinous ligament medially and the facet capsule laterally. Normally this ligament is taut. During flexion it becomes stretched and during extension it becomes contracted while maintaining constant disc tension. As a whole ligament protect the spinal cord, allow adequate physiological movements and provide spinal stability.

Joints stability is also affected by muscles and tendons. The tendons and muscles help to stabilize the spine by holding the articulating bone ends together and prevent excessive movement (Lee, 2006). If the intervertebral disc of lumbosacral spine becomes disturbed or serious pathology affects muscles, ligaments, discs, apophyseal joints and fascias then it results in LBP (McKenzie, 1995).

There are four functional groups of muscles- flexors, extensors, lateral flexors and rotators. These muscles control the lumbar spine. During flexion and extension of the lumbar spine both left and right side muscle groups acts as synergist. The flexor muscles are divided into an extrinsic and intrinsic group. The abdominal wall muscles- rectus abdominis, external abdominal oblique, internal abdominal oblique and transversus abdominis are the extrinsic group muscles. Psoas major and iliacus muscles are the intrinsic group muscles.

The extensor muscles are arranged in 3 layers- erector spinae is the primary extensor which is a single muscle but at the upper lumbar area it divides into 3 vertical columns of muscles (iliocostalis, longissimus, spinalis). The transversospinal muscle is a 3-layered fasciculated muscle includes semispinalis, multifidus and rotatores lumborum. These muscles lie deep to the erector spinae and acts as lumbar spine

extensor and rotator. A multitude of small and segmental muscles are the deepest layer of the lumbar extensors. They act as postural stabilizers and increase the efficiency of larger muscle group action. The lateral flexor of lumbar spine is quadratus lumborum.

The three function of the spine includes load-bearing, provision of movement and protection of neural elements. The spine support the weight and resulting bending moments of the head and upper torso and transfer the load to the pelvis. It allows motion between the torso and pelvis and protects the spinal cord and nerve roots from damage (Niosi & Oxland, 2004).

The spinal column and surrounding muscles provide mechanical stability during dynamic conditions and under heavy loads. There are three subsystems of spinal stabilization system of the spine including- spinal column providing intrinsic stability, spinal muscles providing dynamic stability and neural control unit that evaluate and determine the requirements of stability and coordinate the muscle response. These subsystems work harmoniously and provide mechanical stability. Compression load work on the spinal column during daily living activities. At low load the spine is flexible and with increasing load the spine become stiff. The stiffness of the spine varies with the increasing load. The muscles have larger lever arms than the intervertebral disc and ligaments so muscles are important for spine stabilization. Mostly these muscles maintain the spinal stability during trunk flexion, extension, lateral bending and twisting. The stabilizing system of the spine function by changing the muscle activation pattern in response to the ligamentous tissue mechano-receptor signals via the control unit (Panjabi, 2003).

The vertebral column has two types of movement. They are- physiological and accessory movements. Anterior flexion, extension, lateral flexion and rotation are the normal spinal physiological movements. Distraction and compression of the vertebral column are the accessory movements (Saidu et al., 2011). The zygopophyseal facets of L1-L4 favor flexion, extension and limit lateral flexion, rotation. Flexion occurs greatly at the lumbosacral joint whether lateral flexion and rotation are greatest in the upper lumbar region. Little or no lateral flexion occurs at the lumbosacral joint due to

orientation of the facets. Abnormal kinematics of the lumbar vertebrae plays an important role in LBP (Lee, 2006).

Range of motion (ROM) is the amount of motion that is obtainable at a joint. The starting position of measurement is anatomical position except for rotation. Rotation is measured in the transverse plane (Norkin & White, 1998). There are various methods and devices for measuring lumbar spine motion. The most common methods are Schober technique, radiologic researches, videofluoroscopic analysis, goniometry and inclinometry (Ulucam & Cigali, 2009). Other methods are spondylometers, fingertip-to-floor methods and plumb lines. All of these techniques have some disadvantages such as cost, exposure to radiation, need for specialized equipment and questionable reliability. There is no fully developed method of measurement of back motion for clinical use (Beattie et al., 1987).

Modified Schober's technique is used to measure flexion and extension of the lumbar spine among all these methods. It was described by Macrae and Wright in 1969 (Norkin & White, 1998). The American Academy of Orthopaedic Surgeons (AAOS) also suggests this method in its book on goniometry. It is most accurate clinical method of measuring spinal flexion according to AAOS because it conform spinal curvatures (Fitzgerald et al., 1983).

According to AAOS the measurement of lumbar flexion is 80 degree, extension is 20-30 degree, lateral flexion is 35 degree and rotation is 45 degree. And according to American Medical Association (AMC) lumbar flexion is 60 degree, extension is 25 degree, lateral flexion is 25 degree and rotation is 30 degree (Norkin & White, 1998).

IASP (2012) defined pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. It is a defense mechanism of the body to protect the injured part from further damage.

LBP is neither a disease nor a diagnostic entity of any sort referring pain of variable duration in the lower back (Ehrlich, 2003). It is a nonspecific phrase describes

posterior trunk pain and muscular stiffness or spasm with or without diminished range of motion which occurs between the inferior costal margin and the posterior iliac crests. It may include pain in combination with other symptoms such as buttock or leg pain (Rinkus & Knaub, 2008).

According to the anatomical view pain in the lumbosacral area of the spine surrounding the distance from the 1st lumbar vertebra to the 1st sacral vertebra is termed as LBP where the lordotic curve forms (Kravitz & Andrews, 1984). And European guidelines for management of acute nonspecific back pain defined LBP as pain and discomfort localized below the costal margin and above the inferior gluteal folds with or without leg pain (Kuritzky & Samraj, 2012). It is more accurately called lumbago or lumbosacral pain that occurs below the $12^{th}$ rib and above the gluteal folds (Sikiru & Hanifa, 2010).

It is a major musculoskeletal health problem as two thirds of adults suffering from it at some time in their lives and most common cause of work related disability in people less than 45 years of age (Janwantanakul et al., 2011). It is more prevalent between 35 and 55 years of ages. The most common site of LBP is L4-L5 (Kravitz & Andrews, 1984).

Depending on the duration of pain LBP is classified as- acute pain that lasts less than 6 weeks, sub acute pain that lasts upto 6 to 12 weeks and chronic pain that lasts more than 3 months. Approximately 70% of all back pain resolves within 3 weeks (acute) and upto 90% pain resolve within 12 weeks. About 2%–7% of back pain becomes chronic which causes 75%–85% of total worker absenteeism (Kuritzky & Samraj, 2012).

Chronic low back pain is defined as long-lasting lower back pain continuing for longer than three months (Dartmouth-Hitchcock, 2013). It can originate from diseases, injuries or stresses on various anatomical structures of the body including bones, discs, muscles, ligaments, joints, nerves or the spinal cord. A signal is registered as pain when it comes from the affected structure through nerve endings into the brain through the spinal cord. The sensation of pain may be achy, burning,

stabbing or tingling, sharp or dull, well-defined or vague. The intensity of pain may be mild to severe (Krishna, 2013). It is most common between the age group of 30 to 60 years old and females are more affected than male (Rashid et al., 2012).

There are several possible causes of CLBP that is categorized as mechanical and non mechanical. Mechanical causes account 80-90% of CLBP (Stoppler, 2013). It mainly occurs due to anatomical or functional abnormality (Licciardone, 2004). These include lumbar strain, herniated disks, spondylosis, spondylolisthesis, spinal stenosis and fractures. Among these lumbar strain accounts for 65%-70% of LBP and usually occurs in people in their 40s (Stoppler, 2013). It also includes degenerative disc or joint disease, congenital deformity such as scoliosis, kyphosis, transitional vertebrae etc. and instability (Cohen et al., 2009). Pain from mechanical causes is typically aggravated with motion and relieved with rest (Karnath, 2003).

Non mechanical causes accounts only 1-2% of CLBP include neoplasia, infection, inflammatory arthritis, tumor of the spine or pelvis, primary tumors of spinal cord and secondary tumors (Stoppler, 2013). Onset of non mechanical LBP is usually slow and progressive. Pain from non mechanical causes typically occurs at rest and less affected by motion. But it is typically worsen at night and not relieved by bed rest in case of cancer.

Several factors increase the risk of developing LBP. Among those important risk factors of CLBP includes aging, occupations, gender, level of activity (physical fitness), posture, obesity, previous back injury, smoking and positive family history. Anxiety, depression, stressful responsibility, job dissatisfaction, mental stress at work and substance abuse increases risk for developing CLBP (StopPain.org, 2013).

Symptoms of CLBP are different from person to person depending on the underlying cause of the back pain. Symptoms include- mild to severe pain in the lower back, pain radiating from the buttock to the foot, back stiffness, reduced range of motion, muscle weakness in the hip, thigh, leg or foot and sensory changes (numbness, prickling, burning or tingling) in the leg, foot or toes (Hills, 2012). The pain may be dull aching or sharp in nature (Health Guide, 2013). Other symptoms include sleep interruptions,

depression and inability to sit or stand (Dartmouth-Hitchcock, 2013). Bowel bladder incontinence, atrophy of the lower extremity muscles, inability to walk may also occur (Stoppler, 2013).

Medical history of a patient provides major clues to a potential diagnosis. The detailed history includes- onset, location, quality and radiation of pain, aggravating and relieving factors and associated symptoms such as mechanical LBP increases with motion and decreases with rest whereas non mechanical LBP generally occurs at rest and decreases with motion. In order to exclude serious disease such as metastatic cancer history of fever, weight loss, morning stiffness, radicular pain is necessary.

The physical examination includes inspection, palpation and percussion. At first the spine is examined at rest and in motion. Flexion, extension, side bending and rotation of the lumbar spine is also checked (Quittan, 2002). Standing, sitting, supine and prone positions are observed. Gait is also observed.

Neurological examination includes assessment of muscle bulk, strength, tone, tendon reflexes and sensory examination. Straight leg raise (SLR) test is performed to find out lumbar nerve root irritation (Karnath, 2003). Besides there are some special investigations such as X-rays, bone scans, MRI, CT scan, myelography, discography, electromyography (EMG), nerve conduction studies and evoked potential (EP) studies (Slowik, 2012).

LBP is normally a benign, self-limiting condition and difficult to treat only using medical interventions (Buselli et al., 2011). Thus treatments of CLBP depend on the type and source of pain (Krishna, 2013). Multidisciplinary treatment approach is effective for patients with CLBP (Guzman et al., 2001). The team consists of physicians, physiotherapists, occupational therapists and psychologists (Jacobson et al., 2009). Pharmacological treatments include acetaminophen and non steroidal anti-inflammatory drugs (NSAIDs). Acetaminophen is first-line drug because of its high safety profile and low cost where as NSAIDs have significant gastrointestinal and renovascular adverse effects (Last & Hulbert, 2009). In severe disabling CLBP opioid

analgesics are effective for pain relief. Anti-spasticity drugs are also used in LBP (Chou et al., 2007).

Surgery is indicated only when conservative treatment fails. To remove the source of pain and restore normal loading across the disc is the principle of surgery. The most common operations are posterior lumbar interbody fusion (PLIF) and anterior lumbar disc replacement (Krishna, 2013).

CLBP is a multifactorial phenomenon where physiotherapy plays an important role in the treatment of it. The aim of treatment includes- decreasing pain, increasing strength, normalizing somatosensory deficits, improve functional activity and quality of life (Geletka et al., 2012).

Physiotherapy includes various type of stretching and strengthening exercises, manual therapies such as mobilization, manipulation, McKenzie therapy and electrotherapeutic modalities such as ice, heat, transcutaneous electrical nerve stimulation (TENS), ultrasound (Krishna, 2013). Electrotherapeutic modalities especially hot packs, short wave diathermy, ultrasound, TENS are commonly used to reduce pain (Rashid et al., 2012). Manual therapy is also effective in reducing pain (Moseley, 2002). Massage reduces pain, improves function and relaxation. It become more effective when combined with exercises, stretching and education (Buselli et al., 2011). Spinal manipulation reduces pain, improves functional activities and return to work (Jacobson et al., 2009). Exercise therapy includes strengthening and core stability exercises that reduce pain and improve functions (Last & Hulbert, 2009). Motor control exercise improves neuromuscular control of trunk segments. If spinal manipulation and motor control exercises are used combinedly, the treatment become more effective (Jacobson et al., 2009). Lumbar extension is also effective (Rittweger et al., 2002). Medium-firm mattress is beneficial for the patients (Chou et al., 2007). Recent study shows that early activity, specific core stabilisation exercises, ergonomic and postural advices are effective for LBP management (Fritz et al., 2007).

The prognosis of CLBP is poor. It suffers patients lifelong and cause significant socioeconomic costs (Aure et al., 2003). These poor outcomes may be due to fear-

avoidance behavior, reduced activity levels, depressed mood, withdrawal from social interaction and an expectation of passive treatment.

CLBP is restraint to treat so prevention is better than cure. Educational programmes increase awareness to prevent it. Postural and ergonomic education, avoidance of prolonged static positions such as sitting and standing helps to prevent LBP (Omokhodion, 2002). Avoidance of high-heeled shoes, posture correction during sitting and standing, learning and maintaining of safe lifting techniques, maintaining of healthy weight prevents LBP. A good firm support while lying protect the low back. In addition, cessation of smoking is important for prevention of LBP. Exercise includes aerobic conditioning and strengthening help to prevent LBP. Regular exercise keeps the back healthy and strong (Back Pain Health Center, 2011). It also reduces recurrence of work-related LBP (Hendrick et al., 2009).

Preventative measures along with a regular exercise programme that include stretching, strengthening, low impact aerobic exercise such as swimming, bicycling, walking, core stability exercises and modification of risk factors lessen the occurrence of LBP. Thus improves the quality of life, productivity and decrease absenteeism.

# CHAPTER-III: METHODOLOGY

## 3.1 Study design

Correlational study design was used to identify the relationship between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for the patients with chronic low back pain attended at CRP.

## 3.2 Study area

Data was collected from the outpatient, Musculoskeletal Physiotherapy unit of Centre for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka-1343. Besides this in CRP patient come from all sectors of Bangladesh from all economical condition for comprehensive rehabilitation so it reflects the entire population.

## 3.3 Study population

The study populations were patient with chronic low back pain who attended in CRP for treatment.

## 3.4 Sample size

In this study 60 participants were selected as sample purposively from the population.

## 3.5 Sampling technique

There were sixty participants with CLBP selected through purposive sampling technique from outpatient, Musculoskeletal Physiotherapy unit of CRP, Savar, Dhaka-1343. Participants were selected from CRP because of easy accessibility. Data was collected from the patients purposively who came at CRP to take physiotherapy treatment or continuing their treatment.

## 3.6 Subject inclusion criteria

- Both male and female were included
- Chronic low back pain patient
- All ages were included

### 3.7 Subject exclusion criteria

- History of back surgery
- History of acute low back pain
- History of compression fracture of spine and spinal deformity
- Mentally challenged people

### 3.8 Pilot study

In this context 10 participants were selected to conduct a pilot study. It helped to develop a standard questionnaire.

### 3.9 Data collection procedure and tools

All patients who were diagnosed as CLBP patient by health professionals and came at CRP for first time or continuing their Physiotherapy treatment was asked to participate in the study. The tools that needed for the study were- consent paper, questionnaire, tape, paper, pen, pencil, marker, file, standard analogue weighing machine and calculator. There was a developed semi structured questionnaire according to pilot study findings. The pilot study found that almost maximum participants were female and the mean age of the participants was 44.93 (±13.366) years, most of participants occupation were housewife, duration of LBP was present for less than 1 years. In the questionnaire participant's demographic information including age, sex, level of education, occupational history, health history including other injury and low back pain related information was asked. Then patients ROM of lumbar spine (sagittal plane) were recorded in standing by modified Schober's method using tape which is checked before applying on participants. Participants ROM of lumbar flexion and extension were recorded actively.

#### 3.9.1 ROM measurement

ROM was measured by modified Schober's method. It uses a plastic tape measure to measure ROM of lumbar spine.At first participant was asked to stand erect with bare feet about approximately shoulder width apart. Then the lumbosacral junction was palpated and a small point was made with a marking pen over the corresponding spinal level. A second small point was marked 10 cm above and third small point was

marked 5 cm below the first reference point. Then the participant was instructed to bend forward as far as possible while keeping the knees straight throughout the entire movement. The observer stood slightly posterior and lateral to the participant for observation. After completion of maximal flexion the new increased distance between the points was measured. The difference between this new distance and the starting distance of 15 cm was considered as the amount of flexion. Then the participant was instructed to bend backward as far as possible and after completion of extension the attraction of skin marks was measured. The difference between this new distance and the starting distance of 15 cm was considered as the amount of extension. After each measurement participant was instructed to return to the upright position. Macrae and Wright suggested that this method accurately measure flexion of the lumbar spine. Moll and Wright suggested that it also might be useful for assessing lumbar extension. This method is safe, inexpensive, easy to perform and requires no special equipment (Beattie et al., 1987). It is a good clinical assessment technique and easily accessible to physical therapist (Fitzgerald et al., 1983).

### 3.9.2 Height measurement

Height was measured by using a wall scale. A standard measuring tape was fixed on the wall vertically with the 0 point placed at the floor. Subject stood in front of the wall facing directly ahead with arms hanging freely on sides and both feet kept together. Shoes were taken off. In order to prevent leaning forward or backward, subjects' heels, buttocks and upper back were kept in contact with the wall. Position of the highest point of the head was noted on wall using a scale. Subjects were asked to look straight forward and to keep the zygomatic process horizontally so that neck or head flexion or extension did not affect the position of the vertex. The height of the subject was measured in meters.

### 3.9.3 Weight measurement

Weight was measured by using a standard analogue weighing machine. At first the machine was checked for any mechanical fault. The participant stood on the machine with minimum movement. They were instructed to stand erect to keep both hands hanging on side and wear minimal clothing without any shoe. Reading was taken when the indicator of the machine became steady. Reading was taken in kilogram.

### 3.9.4 BMI calculation

A standard electronic calculator was used to do the calculations.

Body mass index (BMI) = Weight in Kg/ (Height in meter) $^2$

WHO (2013) classified BMI as-

| Classification | BMI in kg/m$^2$ |
|---|---|
| Underweight | < 18.50 |
| Normal | 18.50-24.99 |
| Overweight | ≥ 25.00 |
| Obese | ≥ 30.00 |

Table-1: Classification of BMI

### 3.10 Data Analysis

Data was analyzed by Microsoft Office Excel 2007 using a SPSS 16 version software program. Data were represented by descriptive and inferential statistics.

### 3.11 Informed consent

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

## 3.12 Ethical Consideration

A research proposal was submitted to local ethical review committee of Bangladesh Health Professions Institute (BHPI) for being approval. At first application was done for official permission for the study from the head of the Physiotherapy Department of CRP. Then the head of the Physiotherapy Department of CRP permitted to collect data at musculoskeletal department of CRP, Savar. The ethical consideration was making sure by an informed consent letter to the participant. Consent was obtained by providing each participant a clear description of the study purpose, the procedure involves in the study and also informing them that if they wish they can withdraw themselves any time from the study. Participants were explained about his/her role in the study and it was explained that there is no direct benefit from the study but in future, cases like these may be benefited from it. Participants are also advised that they are free to decline answering any questions during interview. The necessary information had been kept secure place to also ensure confidentiality. They were also assured that it would not cause any harm. Then they signed the consent form.

### 3.13 Limitations

The first limitation of this study was its small sample size which may not represent the wide population and acts as a barrier to generalize the result for wider population of CLBP. There are a few literatures about CLBP in the perspective of Bangladesh so it is difficult to compare the study with the other research. Data was collected only from CRP for a short period of time which will affect the result of the study to generalize for wider population. Again this study evaluated movements of lumbar spine in sagittal plane only. It would be better if movements of lumbar spine in coronal plane were also evaluated. Furthermore it would be better if movements of lumbar spine were measured in degree by goniometry.

# CHAPTER-IV: RESULTS

In this study linear regression analysis was used to identify the relationship between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for the patients with chronic low back pain attended at CRP. Both flexion and extension of the lumbar spine were measured and a relationship was developed with age. Total number of participants was sixty.

The equation is Y = a + bX. Here 'a' constant is called intercept and 'b' is coefficient of X.

## Relationship between increasing age and variation of AROM of lumbar flexion

| Model | R | R Square | Adjusted R Square | Standard Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.84 | 0.71 | 0.71 | 0.54 |

Table-2: Model Summary of relationship between increasing age and variation of AROM of lumbar flexion

| Model | | Sum of Squares | df | Mean Square | F | Significance |
|---|---|---|---|---|---|---|
| 1 | Regression | 41.54 | 1 | 41.54 | 144 | 0.00 |
| | Residual | 16.73 | 58 | 0.29 | | |
| | Total | 58.27 | 59 | | | |

Table-3: ANOVA of relationship between increasing age and variation of AROM of lumbar flexion

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Significance |
|---|---|---|---|---|---|---|
| | | B | Standard Error | Beta | | |
| 1 | (Constant) | 6.92 | 0.25 | | 28.25 | 0.00 |
| | Age of the participants | -0.06 | 0.01 | -0.84 | -12 | 0.00 |

Table-4: Coefficients of relationship between increasing age and variation of AROM of lumbar flexion

From the table-2 we see that R Square = 0.71, so about 71% of variation in objective measurement of ROM has been explained by age per year.
Adjusted R Square = 0.71, loss of predicted power by using this model is 0% (0.71-0.71). That means it could be 0% less variance of population rather than sample.
Constant = 6.92
Slope = -0.06 (negative).

Therefore the regression line takes the following form.
Y = a + bX or, Y = 6.92 + {(-0.06)X} or, Y = 6.92 - 0.06X
The coefficient of X is about -0.06 and it is negative. So the increase of one year of age of a chronic LBP patient there is 0.06 centimeter decrease in ROM. The p value of age is 0.00 in table-3, which is significant therefore one can say that age has an effect on range of motion. More over B = -0.06, we say that with one year increase in age, the active range of motion of lumbar flexion decreases by 0.06 centimeter or 0.6 milimeter.

## Curve Fit

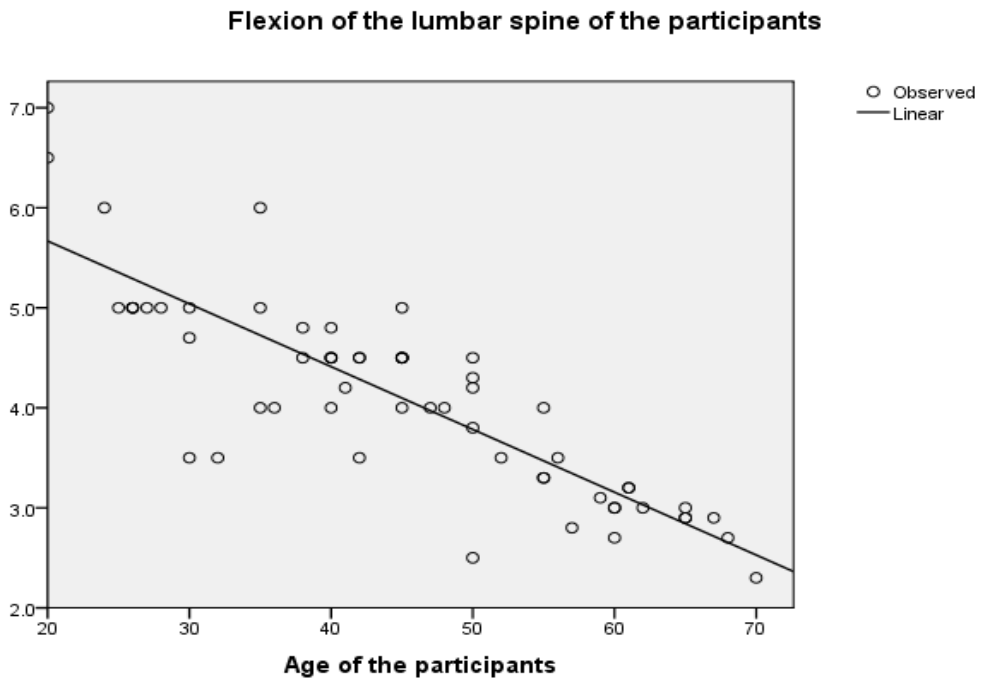



Figure-1: Curve fit of increasing age and variation of active lumbar flexion of the participants

This curve shows that (Figure-1) the slope is directed downwards, that means with the increases of age the active range of motion of lumbar spine flexion is decreases. And from the above discussion we found it with one year increase of age the active range of motion of lumbar spine flexion is decrease by 0.06 centimeter or 0.6 milimeter.

**Relationship between increasing age and variation of AROM of lumbar extension**

| Model | R | R Square | Adjusted R Square | Standard Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.67 | 0.45 | 0.46 | 0.54 |

Table-5: Model Summary of relationship between increasing age and variation of AROM of lumbar extension

| Model | | Sum of Squares | df | Mean Square | F | Significance |
|---|---|---|---|---|---|---|
| 1 | Regression | 14.15 | 1 | 14.15 | 48.32 | 0.00 |
| | Residual | 16.99 | 58 | 0.29 | | |
| | Total | 31.14 | 59 | | | |

Table-6: ANOVA of relationship between increasing age and variation of AROM of lumbar extension

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Significance |
|---|---|---|---|---|---|---|
| | | B | Standard Error | Beta | | |
| 1 | (Constant) | 3.87 | 0.25 | | 15.67 | 0.00 |
| | Age of the participants | -0.04 | 0.01 | -0.67 | -6.95 | 0.00 |

Table-7: Coefficients of relationship between increasing age and variation of AROM of lumbar extension

From the table-4 we see that R Square = 0.45, so about 45% of variation in objective measurement of ROM has been explained by age per year.

Adjusted R Square = 0.46, loss of predicted power by using this model is 1% (0.45-0.46). That means it could be 1% less variance of population rather than sample.

Constant = 3.87

Slope = -0.04 (negative).

Therefore the regression line takes the following form.

Y = a + bX or, Y = 3.87+ {(-0.04)X} or, Y = 3.87 - 0.04X

The coefficient of X is about -0.04 and it is negative. So the increase of one year of age of a chronic LBP patient there is 0.04 centimeter decrease in ROM. The p value of age is 0.00 in table-6, which is significant therefore one can say that age has an effect on range of motion. More over B = -0.04, we say that with one year increase in age, the active range of motion of lumbar extension decreases by 0.04 centimeter or 0.4 milimeter.

**Curve Fit**

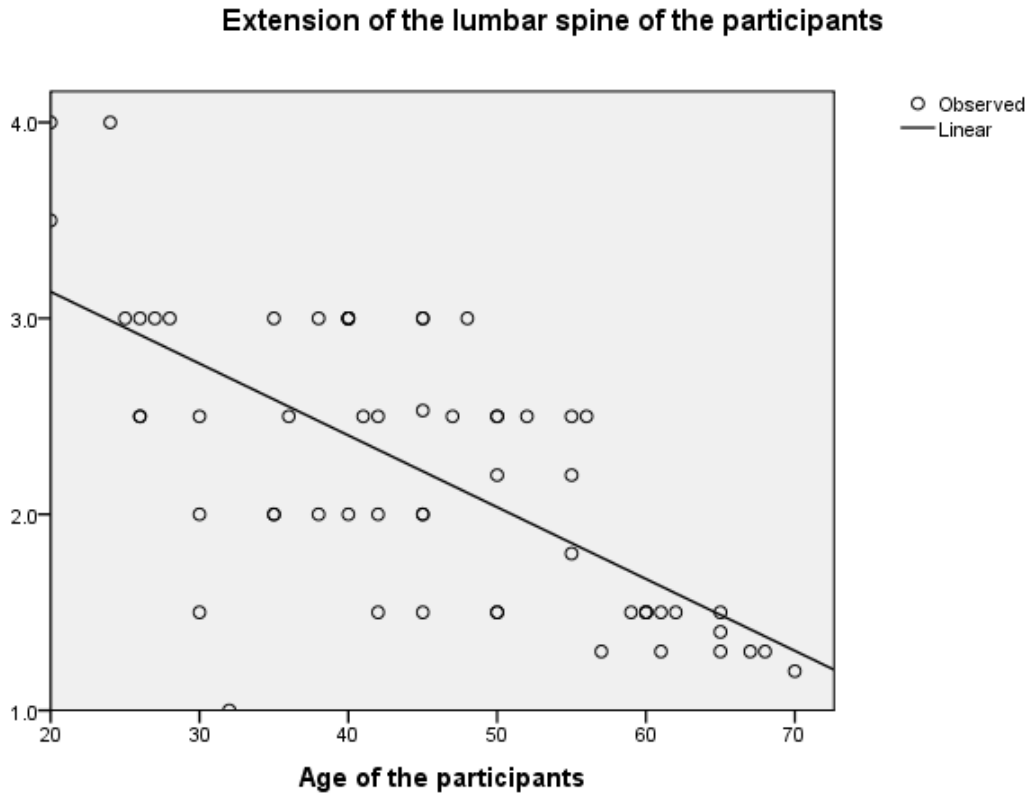



Figure-2: Curve fit of increasing age and variation of active lumbar extension of the participants

This curve shows that (Figure-2) the slope is directed downwards, that means with the increases of age the active range of motion of lumbar spine extension is decreases. And from the above discussion we found it with one year increase of age the active range of motion of lumbar spine extension is decrease by 0.04 centimeter or 0.4 milimeter.

## Age and Gender of the participants

Among the 60 participants 12 (20%) participants were male and 12 (20%) participants were female below or upto 40 years age group, 17 (28%) were male and 19 (32%) were female above 40 years age group. There mean age was 45 (±13.37) years. Overall 40% participants were below or upto 40 years age group and 60% participants were above 40 years age group where 48% participants were male and 52% participants were female.

| **Age group** | **Gender of the participants** | | **Total** |
|---|---|---|---|
| | Male (%) | Female (%) | |
| ≤ 40 years | 12 (20%) | 12 (20%) | 24 (40%) |
| > 40 years | 17 (28%) | 19 (32%) | 36 (60%) |
| **Total** | **29 (48%)** | **31(52%)** | **60 (100%)** |

Table-8: Cross tabulation between age and gender of the participants

## Occupation of the participants

In this study 43% participants were housewife, 22% participants were service holder, 10% participants were businessman, 8% participants were farmer, 3% participants were driver, 3% participants were retired teacher, 3% participants were student and 8% participants were others including engineer, garments worker, construction worker and shopkeeper. The study shows that LBP is higher among housewives than other occupations.

| Occupation | Number | Percentage |
|---|---|---|
| Housewife | 26 | 43 |
| Service holder | 13 | 22 |
| Business | 6 | 10 |
| Farmer | 5 | 8 |
| Driver | 2 | 3 |
| Retired teacher | 2 | 3 |
| Student | 2 | 3 |
| Engineer | 1 | 2 |
| Garments worker | 1 | 2 |
| Construction worker | 1 | 2 |
| Shopkeeper | 1 | 2 |
| **Total** | **60** | **100** |

Table-9: Occupation of the participants

**Body mass index of the participants**

In this study the bar chart shows that (Figure-3) about 3.3% of total participants were underweight, about 33.3% of total participants were normal, approximately 45% of total participants were overweight and about 18.3% of total participants were obese.

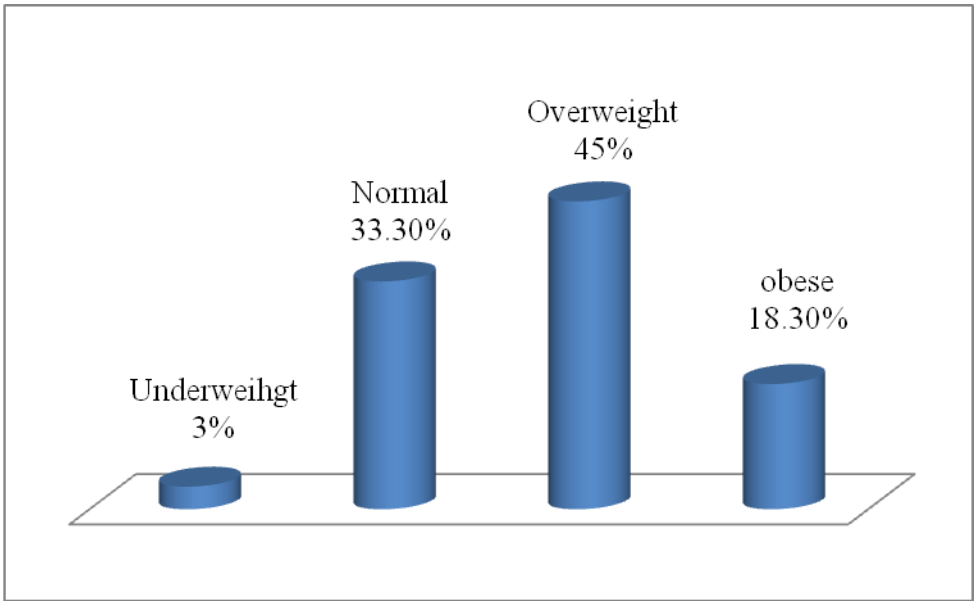



Figure-3: BMI of the participants

## Severity and Duration of pain

Among 60 participants a total of 15 participants had mild pain, 32 participants had moderate pain and 13 participants had severe pain. Among 15 participants with mild pain 7 participants duration of pain was less than 1 year, 5 participants duration of pain was 1-5 year and 3 participants duration of pain was more than 5 year. Among 32 participants with moderate pain 18 participants duration of pain was less than 1 year, 13 participants was 1-5 year and 1 participant was more than 5 year. Among 13 participants with severe pain 5 participants duration of pain was less than 1 year, 7 participants was 1-5 year and 1 participant was more than 5 year. Overall 25% participants had mild pain, 53.33% participants had moderate pain and 21.66% participants had severe pain where 50% participants duration of pain was less than 1 year, 41.7% participants duration of pain was 1-5 year and 8.33% participants duration of pain was more than 5 year.

| **Severity of pain** | **Duration of pain of the participants** | | | **Total** |
|---|---|---|---|---|
| | <1 year (%) | 1-5 year (%) | >5 year (%) | |
| Mild | 7 (11.7%) | 5 (8.3%) | 3 (5%) | 15 (25%) |
| Moderate | 18 (30%) | 13 (21.7%) | 1 (1.7%) | 32 (53.3%) |
| Severe | 5 (8.3%) | 7 (11.7%) | 1 (1.7%) | 13 (21.7%) |
| **Total** | **30 (50%)** | **25 (41.7%)** | **5 (8.4%)** | **60 (100%)** |

Table-10: Cross tabulation between severity and duration of pain of the participants

**Behavior of pain of the participants**

The pie chart shows that (Figure-4) in this study approximately 88% participants behavior of low back pain was continuous and about 12% participants was intermittent.

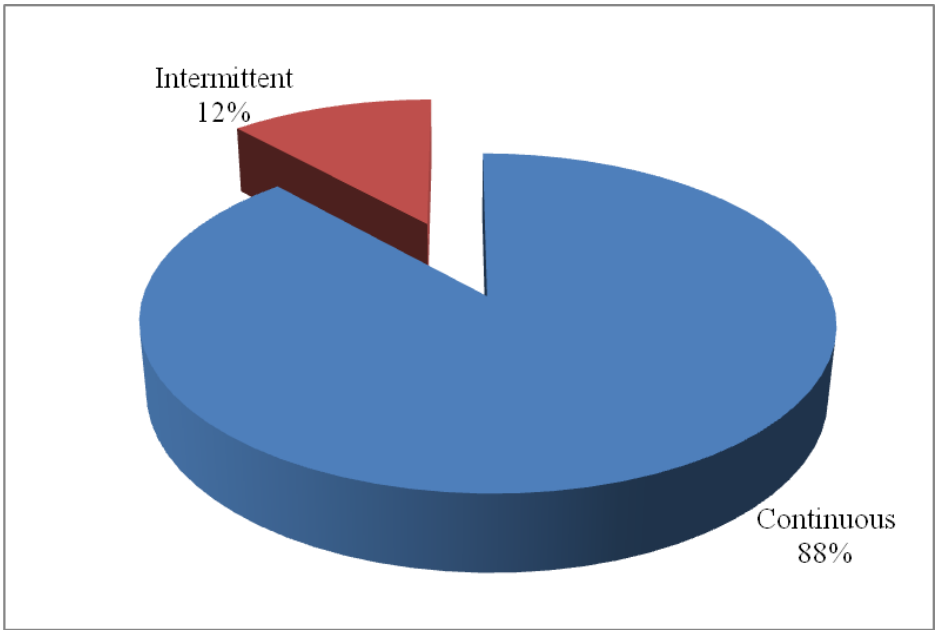



Figure-4: Behavior of pain of the participants

# CHAPTER-V: DISCUSSION

Sixty patients of CLBP were studied. Out of them, 31 (52%) were female and 29 (48%) were male during the course of the study. The male female ratio was 1:1.1. A prospective observational study among the 102 CLBP participants in Dhaka, Bangladesh showed that 60 (58.8%) were female and 42 (41.2%) were male. The male female ratio was 1:1.43 (Shakoor et al., 2007). Biglarian et al. (2012) in an Iranian population found that LBP was more prevalent among female (37.5%) rather than male (18.3%). In Hungarian population the prevalence of LBP among female was 9% higher than male (Horvath et al., 2010).

The study found that the mean age was 45 (±13.37) years and most of the participants (60%) were above 40 years. The approximate age group of maximum number of participants (28.33%) was between 43-55 years. Shakoor et al. (2007) out of 102 CLBP patients found that the mean age of the patients was 42.22 (±8.07) and most of the patients (40.3%) were at the age group of 40 to 49 years which was nearly similar to this study. Another study found that the frequency of LBP was more frequent in 50-59 years (Urquhart et al., 2009).

In this study about 71% of variation in objective measurement of flexion ROM has been explained by age per year because R Square is found in this study is 0.71.The p value of age shows significant; therefore we can say that age has an effect on range of motion. Moreover coefficient is found -0.06; we say that with one year increase in age, the active range of motion of lumbar flexion decreases by 0.06 centimeter or 0.6 milimeter. Researcher does not found any research to see the association between age and range of motion anywhere. But a clear trend of consistent reduction in motion was apparent in each decade of age for all movements with aging in both males and females (Herp et al., 2000). In Nigeria among a total of 135 normal adults with age range 20-76 years found that spinal mobility decreased in both sagittal and coronal planes with advancing age. The study showed that spinal mobility was significantly different among all age groups and that the amount of range decreased in 18 years interval especially in anterior trunk flexion and right trunk flexion in both sexes (Saidu et al., 2011). Jackson et al. (2010) found that decreases in lumbar flexion

between age groups ranged from 2.4º to 7.3º where except the 2.4º decrease between middle and older age group that was not statistically significant, all other decreases in flexion between age groups were statistically significant.

In this study about 45% of variation in objective measurement of extension ROM has been explained by age per year because R Square is found in this study is 0.45.The p value of age shows significant; therefore we can say that age has an effect on range of motion. Moreover coefficient is found -0.04; we say that with one year increase in age, the active range of motion of lumbar extension decreases by 0.04 centimeter or 0.4 milimeter. Researcher does not found any research to see the association between age and range of motion anywhere. Saidu et al. (2011) uncovered that extension had the greatest decrease in ROM with advancing age. Fitzgerald et al. (1983) also found a decrease in lumbar spine mobility with age and revealed a systematic pattern of decrease of extension that not only decrease with age but also this decrease occurs in 20 years interval. Decreases in extension between age groups ranged from 4.9º to 10.8º which was statistically significant (Jackson et al., 2010). This decrease in ROM may be due to its less common performance in ADL rather than anterior and lateral trunk flexion (Saidu et al., 2011). Intolo et al. (2009) showed that age related reduction occurs in flexion and extension particularly from 40 to 50 and after 60 years of age.

The study showed that 43% participants were housewife that means housewives were mostly affected by CLBP this may be due to long time activity in bending, sitting position according to our culture and 22% were service holder, 10% were businessman, 8% were farmer, 3% were driver, 3% were retired teacher, 3% were student and 8% participants were others including engineer, garments worker, construction worker and shopkeeper. A study of 102 cases in Dhaka, Bangladesh found that a majority of the patients were housewives (58.8%) followed by government service holder (19.6%) and businessman (10.8%). Others were labourer (6.9%), private service (2.9%) and retired servicemen (Shakoor et al., 2007). Among the general Afyon population 64.2% housewives suffered from LBP (Tucer et al., 2009). Other study found that most of participants (23.42%) suffered from LBP were housewives (Ullah et al., 2006).

In this study about 3.3% of total participants were underweight, about 33.3% were normal, approximately 45% were overweight and about 18.3% were obese. A study among 177 CLBP patients found that 63.3% participants were overweight or obese and 36.7% were underweight or normal (Salvetti et al., 2012). Another study observed that most of the patients of LBP were obese (45%) and 26% were overweight and also found that females were affected more (Vindigni et al., 2005).

The study showed that about 50% participants duration of low back pain were less than 1 year, approximately 41.7% were 1-5 years and about 8.3% were more than 5 years. One study showed that 63.3% participants had pain for more than 49 months, 23.7% for 19-48 months and 13% for 6-18 months (Salvetti et al., 2012).

The study revealed that about 21.7% of total participants had severe pain, approximately 53.3% had moderate pain and about 25% had mild pain in their low back. Salvetti et al. (2012) found that 61.6% participants had severe pain whether 31.6% had moderate pain and 6.8% had mild pain.

In this study approximately 88% participants behavior of low back pain was continuous and about 12% was intermittent. Shakoor et al. (2007) found that maximum patients (63.7%) had intermittent pain whether 36.30% patients had constant pain.

# CHAPTER-VI: CONCLUSION AND RECOMMENDATIONS

## 6.1 Conclusion

The study concludes that with one year increase in age, the active range of motion of lumbar flexion decreases by 0.06 centimeter or 0.6 milimeter and the active range of motion of lumbar extension decreases by 0.04 centimeter or 0.4 milimeter. For common understanding we multiply -0.06 by 10, which come out to be -0.6 and -0.04 by 10, which come out to be -0.4. This means that with 10 years increase in age active range of motion of lumbar flexion decreases by 0.6 cm and extension decreases by 0.4 cm. Females are more affected than male with CLBP as household and bending activities are aggravating factors to develop CLBP and housewife are more affected group among all occupation. As there is 0.06 cm or 0.6 mm ROM is decreases per year of a CLBP patients active lumbar flexion and 0.04 cm or 0.4 mm ROM is decreases per year of a CLBP patients active lumbar extension, so clinicians should address importance on ROM consciously of CLBP patients in light of their age. Awareness should be raised in functional activity. As females are more affected because of their life style and our culture so we should give more emphasis on them to raised awareness.

## 6.2 Recommendations

The results of the study demonstrate the relationship between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for patients with CLBP attended at CRP. But further research would need to be carried out considering proof of hypothesis in term of association between age and active ROM of OA hip or ankle or shoulder or elbow, age and active ROM without having any pathology of lumbar or the same study can be done by cohort study etc. can further be included in such type of research. Only active flexion and extension of lumbar spine were studied here. Further study can include association between age and active lateral flexion of lumbar spine for CLBP patients or normal healthy individuals.

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# Appendix

## মৌখিক অনুমতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আস্সালামু আলাইকুম/ নমস্কার, আমার নাম পুনম ডি কস্তা, আমি এই গবেষণাটি বাংলাদেশ হেলথ্ প্রফেশনস ইনস্টিটিউট (বি এইচ পি আই), ঢাকা বিশ্ববিদ্যলয়ের চিকিৎসা অনুষদের অধিনে করছি যা আমার ফিজিওথেরাপী স্নাতক কোর্সের আংশিক অধিভূক্ত যার শিরোনাম হল- "সি আর পিতে চিকিৎসারত দীর্ঘমেয়াদী কোমরব্যথার রোগীদের বৃদ্ধিরত বয়স এবং লাম্বার স্পাইনের গতিসীমার পরিবর্তনের (স্যাজাইটাল প্ল্যান) সম্পর্ক "। আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং কোমর ব্যথা সম্পর্কে আনুষঙ্গিক কিছু তথ্য জানতে চাচ্ছি। ফরমে উল্লেখিত কিছু প্রশ্নের উত্তর দেয়ার জন্য আন্তরিক অনুরোধ জানাচ্ছি যা আনুমানিক ২০-৩০ মিনিট সময় নিবে। আমি এই তথ্য সংগ্রহের জন্য শুধুমাত্র একবারই আপনার সাথে সাক্ষাৎ করব।

এই অধ্যয়নের লক্ষ্য হল **"সি আর পিতে চিকিৎসারত কোমরব্যথার রোগীদের বৃদ্ধিরত বয়স এবং লাম্বার স্পাইনের গতিসীমার সম্পর্ক"** সম্পর্কে জানা। যদি এই গবেষণা সম্পূর্নভাবে সফল হয় তাহলে রোগী এবং ফিজিওথেরাপিস্ট উভয়ই বয়সের কারণে লাম্বার স্পাইনের গতিসীমার সীমাবদ্ধতা সম্পর্কে অবগত হবেন। বয়স বৃদ্ধি কিভাবে গতিসীমাকে প্রভাবিত করে তা এই গবেষণার মাধ্যমে ফুটে উঠবে। ফিজিওথেরাপিস্টরা বিশেষভাবে গতিসীমার দিকে লক্ষ্য রেখে রোগীর সমস্যা অনুযায়ী বাস্তব সম্মত চিকিৎসা পরিকল্পনা করবে।

আমি আপনাকে অবগত করছি যে, এটা কেবলমাত্র আমার অধ্যয়নের সাথে সম্পর্কযুক্ত এবং অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না। আপনি আপনাকে আরো নিশ্চয়তা প্রদান করছি যে সকল তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং এই তথ্যের উৎস অপ্রকাশিত থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহণ স্বেচ্ছাপ্রণোদীত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল এবং কোন বিব্রতবোধ ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দেয়ার এবং সাক্ষাৎকারের সময় কোন উত্তর না দিতে চাওয়ার অধিকারও আপনার আছে।

এই সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?

আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি?

হ্যাঁ ☐ না ☐

সাক্ষাৎকার প্রদানকারীর স্বাক্ষর ..... তারিখ .....

সাক্ষাৎকার গ্রহনকারীর স্বাক্ষর ..... তারিখ .....

## VERBAL CONSENT FORM

**(Please read out to the participant)**

Assalamualaikum/Namasker, my name is Punam D Costa, I am conducting a study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled on "Relationship between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for the patients with chronic low back pain attended at CRP" from Bangladesh Health Professions Institute (BHPI) under medicine faculty of University of Dhaka. I would like to know some personal and other related information about your problem. You are modestly 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 the study is to find out the relationship between age and lumbar active range of motion for the patients with chronic low back pain attended at CRP. If the study can be completed successfully, it will provide us important information on the magnitude of lumbar spine mobility that decreases with advancement of age. The research will explore the relationship between age and active range of motion which means with the progression of age how ROM contributes. Physiotherapist will address ROM issues more comprehensively in setting up a holistic goal related to patient's problem.

I would like to inform you that this is a purely academic study and obtained information won't 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 hesitation. You also have the right not to answer a particular question that you don't like or want to answer during interview.

Do you have any questions before I start?

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

YES ☐ NO ☐

Signature of the participant ……Date…….

Signature of the researcher ……Date…….

# Questionnaire

## Title: Relationship between increasing age and variation of active range of motion of lumbar spine (sagittal plane) for the patients with chronic low back pain attended at CRP

| Patient's Identification | |
|---|---|
| 1.1 | Identification Number: |
| 1.2 | Date of Interview: |
| 1.3 | Name of respondent: |
| 1.4 | Address:<br>House number /village:<br>P.O:<br>P.S:<br>Dist: |
| 1.5 | Contact number: |
| 1.6 | Place of data collection: |
| 1.7 | Consent Taken: Yes No |

## Part 1: Patient's Socio-demographic Information

| QN | Question and filters | Response |
|---|---|---|
| 2.1 | Age | …….years |
| 2.2 | Sex | 1= Male<br>2= Female |
| 2.3 | Body weight | ……....kg |
| 2.4 | Height | ……..……m<br>(1 feet = .3048 meter) |
| 2.5 | Body mass index | 1= Under weight (<18.50 kg/m2)<br>2= Normal (18.50-24.99 kg/m2)<br>3= Overweight (25-29.99 kg/m2)<br>4= Obese (≥30kg/m2) |
| 2.6 | What is your marital status? | 1= Married<br>2= Unmarried<br>3= Divorced<br>4= Separated |
| 2.7 | What is your religion? | 1= Islam<br>2= Hinduism<br>3= Christian<br>4= Buddha |
| 2.8 | What is your education status? | 1= Never attended school<br>2= Some primary education<br>3= Complete primary education<br>4= Some secondary education<br>5= Complete secondary education<br>6= Higher secondary<br>7= Bachelor or above<br>8= Others (specify) |
| 2.9 | What is your occupation? | 1= Rickshaw puller<br>2= Service holder<br>3= Farmer |

| | | |
|---|---|---|
| | | 4= Driver<br>5= Businessman<br>6= Day laborer<br>7= Housewife<br>8= Teacher<br>9= Student<br>10= Doctor<br>11= Physiotherapist<br>12= Others (specify) |
| 2.10 | What is your residential area? | 1= Urban<br>2= Rural |

**Part 2: Condition related information**

| QN | Question and filters | Response |
|---|---|---|
| 3.1 | Onset of low back pain | 1= Gradual<br>2= Sudden |
| 3.2 | Duration of pain | 1= Less than 6 month<br>2= More than 6 month |
| 3.3 | Severity of pain | 1= Mild<br>2= Moderate<br>3= Severe |
| 3.4 | Behavior of pain | 1= Occasional<br>2= Intermittent<br>3= Continuous |
| 3.5 | Localization of pain | 1= Central back region<br>2= Up to both buttock<br>3= Radiated above knee<br>4= Radiated below knee<br>5= Others (specify) |
| 3.6 | Previous episode of pain | 1= 0<br>2= 1-5 |

| | | |
|---|---|---|
| | | 3= 6-10<br>4= >11 |
| 3.7 | In which activity pain increases? | 1= Sitting<br>2= Standing<br>3= Walking<br>4= Lying<br>5= Bending |
| 3.8 | In which activity pain decreases? | 1= Sitting<br>2= Standing<br>3= Walking<br>4= Lying<br>5= Bending |
| 3.9 | Which posture do you work most of the time? | 1= Sitting<br>2= Standing<br>3= Bending<br>4= Squatting<br>5= Walking |
| 3.10 | Sitting posture | 1= Good<br>2= Poor |
| 3.11 | Standing posture | 1= Good<br>2= Poor |
| 3.12 | Which posture do you prefer during sleeping? | 1= Supine lying<br>2= Prone lying<br>3= Side lying |
| 3.13 | Which type of mattress you use during sleeping? | 1= Firm / Normal mattress<br>2= Soft / Cushioned mattress<br>3= Wooden / Hard bed |
| 3.14 | Do you feel any pain during heavy weight lifting? | 1= Never<br>2= Sometime<br>3= Often<br>4= All time |

| | | |
|---|---|---|
| 3.15 | What you do in your leisure period? | 1= Gardening<br>2= Reading<br>3= Writing<br>4= Playing<br>5= Watching television<br>6= Fishing<br>7= Horse riding<br>8= Stamp & coin collection<br>9= Others (specify) |
| 3.16 | Do you have diabetes mellitus? | 1= No<br>2= Yes |
| 3.17 | Do you have hypertension? | 1= No<br>2= Yes |
| 3.18 | Do you smoke? | 1= No<br>2= Yes |
| 3.19 | Have you any trauma in the lumbar region? | 1= No<br>2= Yes |
| 3.20 | If yes, types of injury? | 1= Direct trauma<br>2= Twisting<br>3= Lifting<br>4= Carrying<br>5= Others |
| 3.21 | Have you any lumbar spine surgery? | 1= No<br>2= Yes |
| 3.22 | AROM of lumbar spine | |
| 3.22.a | Flexion | ……..cm |
| 3.22.b | Extension | ……..cm |

## Permission letter

To

The Head of the Department,

Department of the physiotherapy,

Center for the Rehabilitation of the paralyzed (CRP),

Savar, Dhaka-1343.

**30th March, 2013**

**Subject: Application for permission to collect data to conduct a research study.**

Sir,

With due respect and humble submission to state that I am Punam D Costa student of 4th year B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). In fourth year course curriculum, we have to do a research project for the partial fulfillment of the requirements for the degree of B.Sc. in Physiotherapy. I have chosen a research title that is "Relationship between age and active range of motion of lumbar spine for the patients with chronic low back pain attended at CRP". The participants would be the patients who are suffering from low back pain and are expected to provide necessary information so that I can conduct this study successfully. I would like to assure that anything of my study will not be harmful for the participants. My supervisor is Nasirul Islam, Assistant Professor and Course Co-ordinator of M.Sc. in Physiotherapy programme. So, I need to obtain permission to collect data from outpatient, musculoskeletal department of CRP.

Therefore, I pray and hope that you would be kind enough to grant my application and give me the permission to collect data from outpatient, musculoskeletal department of CRP.

Yours faithfully

Punam D Costa

Punam D Costa

4th year B.Sc. in Physiotherapy

Session: 2007-2008

BHPI, CRP, Savar, Dhaka-1343.

Md. Sohrab Hossain
Associate Professor Physiotherapy, (BHPI), CRP
Head, Dept. of Physiotherapy,
CRP, Savar, Dhaka-1343