



**Faculty of Medicine**

**University of Dhaka**

**Risk factors of Prolapsed Lumbar Intervertebral Disc (PLID) among  
the low back pain patients attended at CRP: A case control study**

By

**Masud Ur Rahaman**

Master of Science in Physiotherapy

DU Roll No: 704

Registration No: 3476

Session: 2020-2021



**Bangladesh Health Professions Institute (BHPI)**

Department of Physiotherapy

CRP, Savar, Dhaka-1343,

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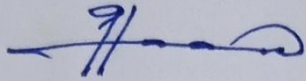
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May, 2023

We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for acceptance of this thesis entitled, "**Risk Factors of Plid Among The Low Back Pain Patients Attended At Crp: A Case Control Study**", submitted by **Masud Ur Rahaman**, for the partial fulfillment of the requirements for the degree of Master of Science in Physiotherapy.

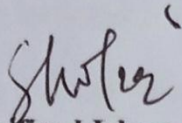


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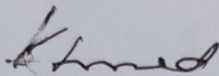
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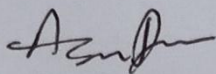
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## Declaration Form

This work has not previously been accepted in substance for any degree and isn't concurrently submitted in candidature for any degree. This dissertation is being submitted in partial fulfillment of the requirements for the degree of M.Sc. in Physiotherapy. This dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A Bibliography is appended. I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority. I confirm that the electronic copy is identical to the bound copy of the Thesis. In case of dissemination the finding of this project for future publication, research supervisor will highly concern and it will be duly acknowledged as graduate thesis.

  
(Signature)

Name: Masud Ur Rahaman

Date: 10.06.2023

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## List of Abbreviation

|              |   |  |
|--------------|---|--|
| <b>BHPI</b>  | : | Bangladesh Health Professions Institute        |
| <b>BMI</b>   | : | Body mass index                                |
| <b>BMRC</b>  | : | Bangladesh Medical & Research Council          |
| <b>CRP</b>   | : | Centre for the Rehabilitation of the Paralysed |
| <b>DALYs</b> | : | Disability Adjusted Life Years                 |
| <b>DM</b>    | : | Diabetes Mellitus                              |
| <b>HTN</b>   | : | Hypertension                                   |
| <b>IHD</b>   | : | Ischemic Heart Disease                         |
| <b>IRB</b>   | : | Institutional Review Board                     |
| <b>PLID</b>  | : | Prolapsed lumber intervertebral disc           |
| <b>sEMG</b>  | : | surface electromyography                       |
| <b>WHO</b>   | : | World Health Organizations                     |

## ABSTRACT

**Background:** Low back pain is a leading cause of disability worldwide, and is one of the most common reasons people go to the physician. Low back pain, also known as lumbago, is a common symptom of the back muscles, nerve endings, and bones, especially between the lower edge of the ribs and the lower fold of the buttocks.

**Objective:** To find out the risk factors of PLID among low back pain patients attended at CRP.

**Methods:** A hospital based unmatched (1:1) case-control study was carried out to complete the objectives of the study. Thirty participants with low back pain were identified from musculoskeletal unit of CRP as case and another thirty patients were selected as control. The data was collected by using a structural questionnaire by face to face interview.

**Analysis of data:** SPSS version 25 was used for data analysis.

**Results:** Comparison of 30 identified cases with 30 controls revealed the highest odds ratios (OR) for positive family history (OR 2.61; 95% confidence intervals [CI], 1.49-3.87, intensity of physical labor at work defined as “hard” (OR 1.581; 95% CI, [0.544-4.600]), and body mass index of 25.7 or more (OR 1.212, 95% CI, 0.433-3.392). A simple screening test based on the presence of any two of these three criteria has 74% sensitivity and 82% specificity to detect persons who underwent lower spine surgery due to lumbar intervertebral disc herniation or PLID in the population aged 40 years or more.

**Conclusion:** It is possible to forecast the occurrence of a lumbar disc herniation or PLID severe enough to call for surgery on the lower spine by making use of an extremely straightforward set of parameters. By focusing on prevention within primary health care, this kind of screening could reduce the number of times people in remote regions need to have surgery.

**Key Words:** Risk factors, prolapsed lumber intervertebral disc, low back pain

**WordCount:**14459

**1.1 Background**

According to the World Health Organization, 10% of Bangladesh's population is disabled (Hossain, 2016). Prolapsed Lumbar Intervertebral Disc, or PLID, is one of the most prevalent causes of disability and a financial burden on individuals, society, and around the world (McKenzie, 2017). The most frequent condition in developed Western countries is PLID, or Prolapsed Lumbar Intervertebral Disc. Prolapsed Lumbar Intervertebral Disc affects about 80% of people at some point in their lives (Fatima, 2016). PLID limits activities and is the second most common reason for seeking treatment and the third most common reason for undergoing surgery (Apfel et al., 2021). In a recent study on the global burden of disease, low back pain placed sixth in terms of the overall burden of disease, just behind stroke and HIV/AIDS and ahead of 291 other ailments such as road injury, depression, diabetes, and others (Manik, 2020).

According to the World Health Organization (WHO), non-communicable diseases (NCDs) are one of the biggest health challenges to global development, posing a hazard to almost 60% of fatalities worldwide, with around 80% occurring economically developing countries. Not only that, but NCDs are responsible for half of all annual deaths (51%) and nearly half of all disease burdens (41%) (Bleich et al., 2016). Because of a rise in lifestyle-related risk factors, which are assumed to be underlying variables as a result of social and economic transformation. According to the study, Bangladesh, like many other countries in the field of chronic problems or impairments, has been undergoing an epidemiological transformation of global disease threats (Bleich et al., 2016). 78.2 percent of people had Prolapsed Lumbar Intervertebral Disc Disease. Disc bulging affects 56% of people (Manik, 2020). One of the most frequent musculoskeletal problems in the population is prolapsed lumbar intervertebral disc (PLID) (Khruakhorn et al., 2018).

Prolapse of the lumbar intervertebral disc (PLID) which is frequently encountered in clinic, may often induce low back and/or leg pain. The incidence is 1.9%-7.6% in men, and 2.2%-5.0% in women (Tang, et al., 2016). The prolapsed lumbar intervertebral disc (PLID) is one of the most common, chronic lumbar vertebral

column diseases of elderly people leading to back pain, low back pain, sciatica, quadra equines syndromes, radicular pain, and subsequently neurological deficit due to nerve root compression that leads to radiating pain up to whole lower limb (Wei et al., 2015). The lumbar intervertebral disc which is a complex structure composed of glycosaminoglycan, collagen, proteoglycans, sparse fibro chondrocytic cells that serve to dissipate forces exerted on the spine. As part of the normal aging process, the disc fibro chondrocytes can undergo senescence which proteoglycan production diminishes. This leads to a loss of hydration and disc collapse, which increases strain on the fibers of the annulus fibrous surrounding the disc., Facilitating a herniation of disc material, should sufficient forces be placed on the disc, tears and fissures in the annulus can result. Instead, a large biomechanical force placed on a healthy, normal disc may lead to extrusion of disc material in the setting of the catastrophic failure of the annular fibers.

PLID also known as a slipped disc is the soft, central portion to bulges out beyond the damaged outer rings a medical vertebral dissection affecting the spine. Rarely bowel or bladder control is lost, and if this occurs, seek medical attention at once (Shin et al., 2019). Symptoms of a herniated disc may include spasm or cramping, dull or sharp pain, muscle, sciatica, and leg weakness or loss of leg function. Sneezing, coughing, or bending usually intensify the pain. Prolapsed lumbar disc disease is the drying out of the spongy interior matrix of an intervertebral disc in the spine. Pain loss of muscle strength and loss of touch sensation may occur if this herniation causes the compression of the most proximal part of the nerve closely neighbouring the intervertebral disc material (Glazov et al., 2016).

Pain which is the distribution of the nerve compressed, usually down the back of the leg, side of the calf, and inside of the foot call sciatica. Most commonly, the nerve root between the fourth and fifth lumbar vertebrae or between the fifth lumbar vertebra and first sacral segment have impinged., The diagnosis should be confirmed by an MRI scan in symptomatic cases. However, in cases with slight symptoms, a faster and cheaper CT scan (although it is inferior to an MRI scan) may be recommended (Li et al., 2015).

While an MRI scan can better portray soft tissue a CT scan can show the bony structures in more detail. It is identified that high-risk working people who are in

occupations in the construction and building business, the iron or metal industry, the food and nutrition sector, and occupational driving were among the most prevalent of suffering PLID. Drivers from all sorts of professional backgrounds are also at an increased risk of collision, to a greater or lesser level of PLID. Domestic assistants, private-sector service workers, and sewing machine operators are examples of women who work in high risk employment, the majority of whom are employed in the same industries as males. According to the medical case history, PLID is statistically significant and systematic disparities in the likelihood of hospitalization across many occupational categories (Kim et al., 2016).

Musculoskeletal problems are a major public health issue in our culture. Prolapsed Lumbar Intervertebral Disc has a lifetime prevalence rate of up to 85-90 percent (Taechasubamorn et al., 2021). Lumbosacral pain is caused by a prolapsed lumbar intervertebral disc, which is a common musculoskeletal disease. Its clinical manifestation could be acute, subacute, or chronic. It affects 80% of the population at some point during their lives (Srivastava, 2019). In Bangladesh, the number of people with the prolapsed lumbar intervertebral disc is increasing and is a matter of concern. Disc degeneration is a cellular-mediated abnormal reaction to gradual structural failure. A degenerative disc is one that has a structural breakdown as well as advanced or accelerated indicators of aging (Miranda, 2018).

Lumbosacral radiculopathy is most commonly caused by PLID (Hahne et al., 2016). The lumbar radicular syndrome is caused by a prolapsed lumbar disc (Erdogmus, 2018). The lower limb may be exposed to PLID. Leg pain as a referred symptom associated with back pain or a prolapsed lumbar intervertebral disc has been estimated to be 35 percent common, while real sciatica frequency is 2-5 percent (Delgado-Lopez et al., 2017). Because it causes temporary productivity loss, expensive medical and indirect expenditures, or perhaps permanent incapacity, PLID has important social implications (Apfel et al., 2021). As one of the most frequent health conditions, PLID is a global cause of personal, community, and financial stress (Hoy et al., 2019). One of the most common causes of impairment in the working population is PLID.

The occurrence of musculoskeletal disorders or other musculoskeletal diseases was highly linked to self-reported occupational impairment (Miranda et al., 2018). Low back pain is a very common occurrence. Mechanical issues are the most common

cause (about 90%), while the rest of the cases (70% to 85%) have no known cause. Any lesion to an intervertebral disc (disc tear, disc herniation), ligament, or joint results in discomfort (Manusov, 2019).

LBP can be caused by a variety of reasons. According to Fatima (2016), the mechanical Prolapsed Lumbar Intervertebral Disc is the most common cause of work-related occupational impairment. Poor sitting position aggravates prolapsed Lumbar Intervertebral Disc in both sedentary and manual workers (McKenzie, 2017). Although disk protrusion and herniation have been promoted as causes of LBP, the most common cause of Prolapsed Lumbar Intervertebral Disc is traumatic or degenerative diseases of the spine (Wheeler & Richards, 2017). According to Meucci et al., 2015, the prevalence of LBP ranges from 15% to 30%, with worldwide estimates ranging from 50% to 85%. According to Liu et al., (2021), the one-year prevalence of LBP in the United Kingdom was 49%, while it was 35% in the Nordic countries. According to Fan et al., (2019), LBP prevalence rates are 30% and 40% in the Netherlands and Belgium, respectively; 60% of LBP is recognized as an occupational condition in Italy, and 40% of LBP is reported in France. Furthermore, a cross-sectional survey of car drivers discovered that 78% had back pain on at least one day in the previous year (Nahar et al., 2022).

As one of the most frequent health diseases, prolapsed Lumbar Intervertebral Disc is a global cause of personal, community, and financial strain (Hoy et al., 2019). Because LBP can result in a temporary loss of productivity, substantial medical and indirect costs, or even permanent disability, it has a significant socioeconomic impact (Apfel et al., 2021). In 86 nations, low back pain (LBP) is the top cause of long years disabled, and in 67 countries, it is either the second or third major reason (Rabindra et al., 2019). LBP was projected to have a global age-standardized point prevalence of 9.4% in 2010 (Hoy et al., 2019). Back pain that interferes with daily activities is very common (17% to 70%) (Takasaki & May, 2020).

Mechanical back pain could be a general definition that refers to any sort of back pain caused by inserting abnormal stress and strain on muscles of the backbone. Typically, mechanical pain results from dangerous habits, like poor posture, poorly designed seating, and incorrect bending and lifting motions (Fahmy, Shaker, Ragab, Helmy, & Gaber, 2019). Mechanical low back pain (LBP) remains a vital health drawback and a

serious explanation for incapacity within the operating age, and in most of the cases, there is no clear underlying pathology (Coggon et al., 2017). There are several factors inflicting mechanical low back pain, like excessive masses to normal spinal structures. The loads transmitted to the spine are affected by posture, body mechanics, trunk strength, and also flexibility in addition to strength of the muscles of the pelvic arch and lower extremities (Fahmy, Shaker, Ragab, Helmy, & Gaber, 2019). McKenzie extension exercise could be a treatment of selection of LBP that specializes in sustained posture or continual movement, which will cause marvelous improvement in pain intensity (Narouei et al., 2020). Studies have shown that the goals of McKenzie program have resulted in decreasing and rising pain, improvement of body part quality, and return to normal functioning in daily activities (Shin, Kang, Kwon, & Yu, 2017). Muscle energy technique is an associate degree of osteopathic manipulation methodology. The muscles of patients were used, on request, to type a singular controlled position, in a very specific direction, and against a distinctly executed therapist-applied counterforce. Muscle energy technique could be a post-isometric relaxation, because it reduces the tone of a muscle or cluster of muscle after a brief period following an isometric contraction. The result of post-isometric relaxation is mediated by receptive input from Golgi connective tissue organ (GTO) that has associate degree repressive result on the antagonist muscles mediated by the muscle spindle receptive (Faqih, Bedekar, Shyam, & Sancheti, 2019). In this study self-structured questionnaire and Oswestry disability index questionnaire has been used to measure the risk factors of PLID among LBP patients.

## **1.2 Rationale**

Non-specific low back pain has become a major public health problem worldwide. Mechanical factors, such as lifting and carrying, probably do not have a major pathogenic role, but genetic constitution is important. Non-specific low back pain affects people of all ages and is a leading contributor to disease burden worldwide. Management guidelines endorse triage to identify the rare cases of low back pain that are caused by medically serious pathology, and so require diagnostic work-up or specialist referral, or both. Because non-specific low back pain does not have a known patho-anatomical cause, treatment focuses on reducing pain and its consequences. Management consists of education and reassurance, analgesic medicines, non-pharmacological therapies, and timely review. The clinical course of low back pain is often favourable, thus many patients require little if any formal medical care. Two treatment strategies are currently used, a stepped approach beginning with more simple care that is progressed if the patient does not respond, and the use of simple risk prediction methods to individualize the amount and type of care provided. The overuse of imaging, opioids, and surgery remains a widespread problem. History taking and clinical examination are included in most diagnostic guidelines, but the use of clinical imaging for diagnosis should be restricted. The mechanism of action of many treatments is unclear, and effect sizes of most treatments are low. Both patient preferences and clinical evidence should be taken into account for pain management, but generally self-management, with appropriate support, is recommended and surgery and overtreatment should be avoided. The number of PLID is increasing day by day due to lack of awareness. It affects a large number of individuals who became a burden for themselves and make a devastating effect on their family and society. So, the study was conducted with the risk factor of PLID for the patients who attended at CRP. Researchers hope this study has given clear clarifications about the risk factors of PLID and other health professionals can update their knowledge about the risk factors of PLID.



### **1.3 Research Question**

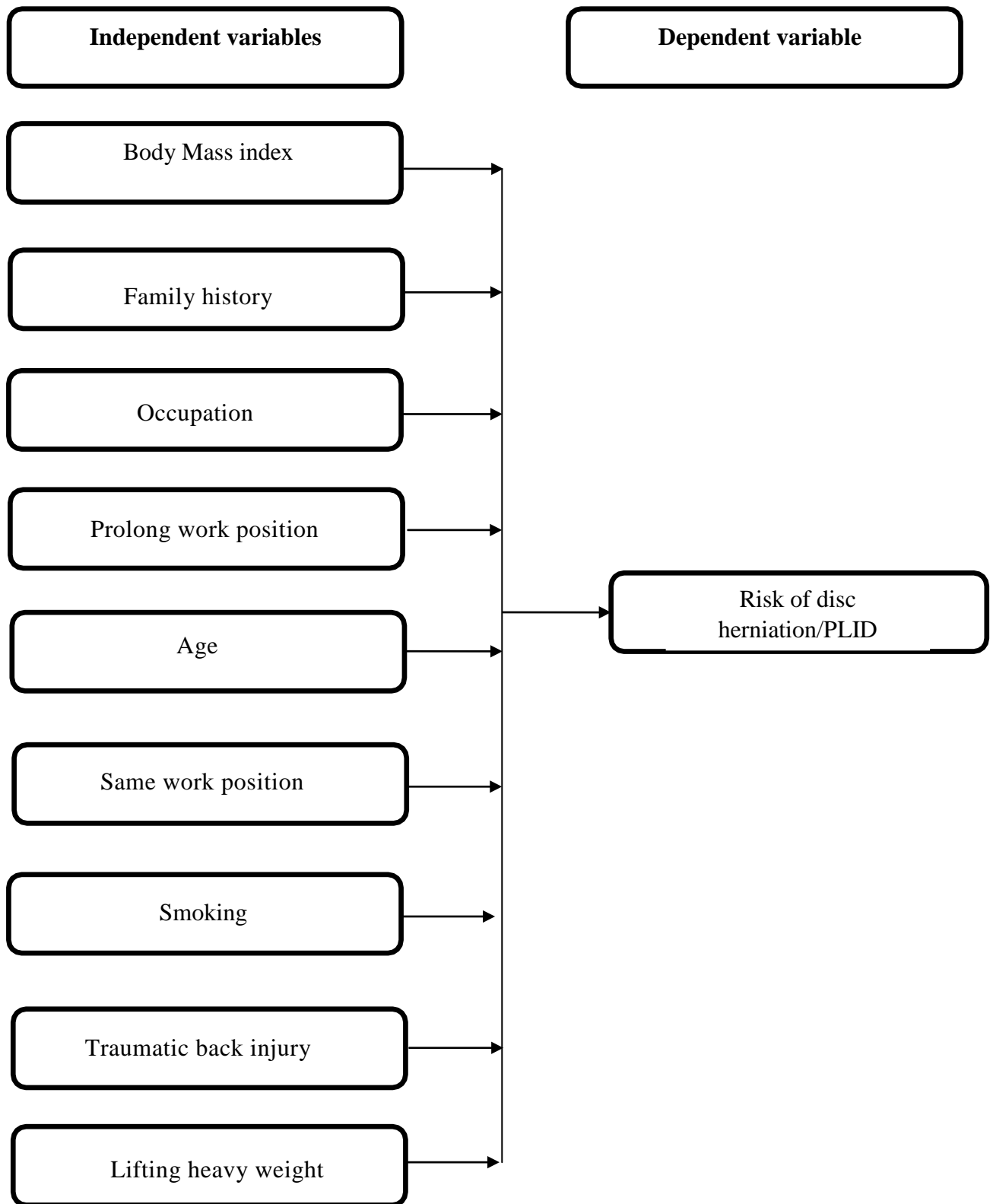
What are the risk factors of Prolapsed Lumbar Intervertebral Disc (PLID) among low back pain patients attended at CRP?

**1.4 General objective:** To find out the risk factors of Prolapsed Lumbar Intervertebral Disc (PLID) among low back pain patients attended at CRP.

**1.5 Specific objectives:**

- i. To explore socio-demographic (age, gender, occupation, educational status, socio-economic status) characteristics of patients with low back pain.
- ii. To identify the association between demographic factors and PLID applying Chi-square test.
- iii. To find out the association between disability and low back pain through Oswestry Low Back Pain Disability Questionnaire.

## 1.6 List of variables



## **1.7 Operational definitions**

### **Risk Factor**

Something that raises the odds of getting sick is called a risk factor. It's possible that your actions contribute to the danger. For instance, tobacco use raises one's risk of colon cancer. Therefore, tobacco use increases the danger of developing colon cancer. Sometimes you can take precautions, but other times you can't. It is a fact of life. People over the age of 50, for instance, have a higher risk of developing colon cancer than those under the same age. Age, then, is a determinant in the development of colon cancer.

### **Herniated disc**

When the nucleus pulposus of a spinal disc bulges into the spinal column's intervertebral space, the condition is known as a herniated disc. Injuries to the spine are a common result. Many people who suffer from herniated disc discomfort may pinpoint its onset to a specific incident. Herniated discs cause a different kind of pain in the lower back and legs than mechanical back pain.

### **Lumbosacral radiculopathy**

Pain in the lower back and hip that travels down the back of the thigh and into the leg is a symptom of a condition known as lumbosacral radiculopathy. When the nerve roots that exit the spine at levels L1 to S4 are compressed, irreparable damage occurs. Tingling, radiating pain, numbness, paraesthesia, and even occasional shooting pain are all possible outcomes of the compression. Although it can affect any area of the spine, radiculopathy most frequently affects the lower back (sacroiliac radiculopathy).

### **Low back pain**

Depending on the cause, low back discomfort can be described in a variety of ways. It is defined as "pain and discomfort, localised below the costal margin and above the inferior gluteal folds, with or without leg pain" in the European Guidelines for the prevention of low back pain. As another definition puts it, "pain that occurs posteriorly in the region between the lower rib margin and the proximal thighs" describes low back pain quite well. According to the definition

of "non-specific low back pain," which is "low back pain not attributed to recognisable, known specific pathology," this type of back pain accounts for the vast majority of cases.

### **Intervertebral disc**

Between each pair of vertebrae is an intervertebral disc, which consists of a soft, gelatinous centre and a stiff, fibrous exterior. The disc functions as a shock absorber in the spine, allowing for mobility while also shielding vertebrae from damage caused by sudden stops or impacts.

Nowadays around the world working population become apparent with significant health problem- Low back musculoskeletal pain disorders. (Hoy et al., 2019). According to Balague et al., 2021, people experiencing low back pain throughout their whole life are 84%, among them 23% encounter chronic low back pain and 11 to 12% being disabled by low back pain. In accordance to some studies, second most predominant cause of disability in people of United States is LBP and a conventional reason of absence from work. It has been seen that over 149 million days of work are lost each year due to low back musculoskeletal discomfort and that the treatment expenses a great amount of money, with annual loss of \$100 and \$200 billion in the Western world (Freburger et al., 2019).

Low back architecture consists of vertebral bodies (bones of the spine), vertebral discs (cushions between the bones), cartilage (lines the bones that connect with other bones), and supporting structures surrounding the spine, such as muscles, tendons (connecting muscle to bone), and ligaments (connecting bone to bone) (Poilliot, Zwirner, Doyle, & Hammer, 2019). Intractable back pain and degenerative disc disease (DDD) patients can be treated with various method of intervention. By interbody fusion procedures, the mechanical beneficiary effect of the disc space anteriorly, such as a large fusion bed, excellent blood supply, and graft compression can be achieved (Truumees et al., 2018). Disc herniation (protrusion or worse), nerve root deviation/compression, disc degeneration, and high-intensity zone (HIZ) are the evidence that LBP is related to these MRI abnormalities in the spine. People with back pain have no visible pathology on MRI and these abnormalities can be identified even when there are no symptoms. (Shambrook et al., 2019).

Prevalence estimates vary depending on the definition of low back pain used. Ozgule et al. (2016) recorded that prevalence in the previous 6 months was 8% when low back pain was defined as requiring sick leave, whereas when it was defined as pain lasting at least a day, prevalence was 45%. Risk factors also differed with the definition of low back pain used, making comparisons between studies difficult. Reports often state that most patients with acute low back pain recover reasonably quickly and that only about 10–15% develop chronic symptoms.

Fardon et al. (2019) discovered that low back pain is among the leading causes of disability in the world. Injury or degeneration of intervertebral discs (IVDs) in the spine can be a cause of this disability. The IVD has a complex structure to enable the biomechanics of human movement. The spinal column consists of a series of intervertebral discs and vertebrae that originates at the base of the skull and extends to the coccyx. The complete structure is typically divided into five parts: the cervical region (C1-C7), the thoracic region (T1-T12), the lumbar region (L1-L5), the sacral region (S1-S5), and the coccygeal region (Co1-Co4/5). It provides flexibility and mobility for the body and gives protection to the spinal cord. The intervertebral discs support the spinal column and behave like shock-absorbing cushions against the axial loading of the human body (Yow, Piscoya & Wagner, 2021). These structures are built of two components: a nucleus pulposus (which is the inner part) and an outer annulus fibrosus (AF). The nucleus pulposus, which consists of collagen (type II), makes up 20 percent of the dry weight of the disc. It also contains numerous proteoglycans that maintain hydrostatic pressure by retaining water. The other ingredients are water and chondrocyte like cells. This composition helps the nucleus pulposus remain elastic, capable of absorbing compression, and flexible under stress forces. In turn, the annulus fibrosus is formed from collagen type I, which forms a fibrous tissue around the nucleus pulposus (Frost, Camarero-Espinosa & Foster, 2019). The annulus fibrosus is attached to the vertebral body by Sharpe fibre and it was discovered by Omid-Kashani et al. (2016). Degenerative changes in the intervertebral discs (IVDs) can cause a loss of hydration in the nucleus pulposus reducing IVD height. Amin et al. (2017) discovered that lumbar IVD herniation is one of the most common degenerative spinal diseases causing low back pain and sciatica.

The most usual problems that provoke low back pain is injury or overuse of muscles, ligaments, and joints, pressure on nerve roots in the spinal canal (caused by a herniated disc, by repeated vibration or motion at the time of sports activity or while using a machine or lifting in the wrong way). However, if it affects the small joints in the spine as a complication of osteoarthritis in old age can also provoke LBP. Spondylolisthesis, Fractures of the vertebrae, spinal stenosis are also factor for low back pain (Yow, Piscoya & Wagner, 2021). Severe scoliosis or kyphosis leads to curvature issues which is caused in spinal abnormalities. Lumbar disc herniation can become a medical, societal, and financial issue. It is generally detected in young

teenagers though it may affect people of all ages. According to epidemiological studies, the occurrence rate is around 30%, gradually increasing after the age of 30 and peaks in patients aged 55-64 years (Zhelev, Tsonev & Mollov, 2022). 50% of patients over the age of 40 with no symptoms shows ruptured discs, spinal stenosis and other degenerative abnormalities under CT scans. About 5% of the male and 2.5% of the female population had been identified with an advanced stage herniated disc and rate of these cases are gradually increasing according to the official data by 2014 (Kasnakova et al., 2018).

Gonzalez-Fiol (2018) said that disc herniation is an intervertebral disc pathology occurs when either part of the nucleus pulposus protrudes through the annulus fibrosus. The most common cause is chronic herniation e.g., disc degeneration occurring due to reduced proteoglycan content, in which the nucleus pulposus is weakened due to loss of hydration. In contrast, acute herniation can occur by the result of trauma, resulting in the nucleus pulposus extruding through a defect in the annulus fibrosus. Many genetic, mechanical and behavioural factors are related. MRI is the first choice of examination method (Yamada, Iwasaki & Sudo, 2022). It allows disc herniation to be classified according to the shape and extent and distinguishes three types, protrusion (largest diameter of the disc material projecting beyond the normal margin of this disc is narrower than the general width of the base), extrusion (characterized by a base length less than the height), and sequestration (a subtype of extrusion, which occurs when there is no connection between the herniated material and the intervertebral disc) and it was reported by Rezende et al. (2015) . There is also a disc bulge (which involves more than 25% of the circumference), another kind of discopathy that MRI also reveals. It is important that the prevalence of disc bulge in asymptomatic individuals increases from 30% of those 20 years of age to 84% of those 80 years of age. In turn, more advanced disc herniations usually compress neural structure, which causes various types of pain (Brinjikji et al. 2015)

Population aged 30 to 50, with a male to female ratio of 2:1 present with pain, physical impairment in some cases due to lumbar spine disc herniation or disc prolapse. (Jordan et al., 2018). In addition, Disc prolapse can affect population of any age group while increasing incidence in the fourth and fifth decades of life with a prevalence of 4.8 percent among men over 35 years of age and 2.5 percent among women over this age (Islam, 2019). Some studies shows that the rate of low back pain



(LBP) in the general population ranges from 12% to 33% at any given time while lifetime prevalence peaks 84% (Kashani et al., 2022). About 76% of cases have a prior history of low back pain during the last ten years and the average age of first attack is 37 (Islam, 2019).

It was discovered that the main causes of disc herniation were aging and mechanical insults, and that smoking status, aging, obesity, height, sciatic axial overloading, or occupation had the greatest influence on the presence of intervertebral disc pathology (Feng et al., 2016). Although both obesity and height can be classified as anthropometric measurements, the latter is rarely raised in studies. Environmental, i.e., mechanical and behavioural, factors associated with occupation (physical workload, hard work, a working period longer than eight hours, and stress at work) are believed to be the major factors in intervertebral disc pathology (Ahsan et al., 2019). A number of studies from the last century focused solely on the environmental factors of intervertebral disc pathology, with no mention of the possible influence of genetic factors. For example, one study found that men who drove a motor vehicle for half or more of their working time were three times more vulnerable to acute lumbar herniation than other people; however, this study did not assume any possible genetic predisposition. Another study proposed that the main mechanism in the degeneration of the intervertebral disc was the nutritional decline of the central disc. This was suggested to lead to collection of waste products, the degeneration of matrix molecules, and a fall in pH, which may cause cell death. This is true, but later studies demonstrated that polymorphisms or mutations among genes associated with substances of connective tissue also accelerated the degeneration of intervertebral disc (Trefilova et al., 2021).

One of the major problems faced by working population is PLID which causes impairment. The term "disability" has been described as "limited functioning," including "activity limitation" and "participation in living circumstances." Ranges in severity, temporary or permanent, PLID is usually causes disability. (Waddell, 2017). Difficulties performing, accomplishing or completing a task when there is a qualitative and quantitative change in the way of activities are carried out, difficulties in doing them arise is the emphasis of the international classification of functioning, disability, and health has shifted to activity and activity limitation. All of the factors that can influence how an activity is completed is termed as difficulty. According to

the length of PLID acute pain lasts up to 7 days, sub-acute pain lasts more than 7 days but less than 7 weeks, and chronic pain lasts more than 7 weeks (Baylor & Darling-White, 2020). A patient who has recurrent periods of pain separated by at least 3 months of pain-free time meets the diagnosis of acute LBP and symptoms are fluctuating at variable intensity throughout lifetime. Five vertebrae form lumbar vertebral column, intervertebral disc between them. Functioning of the spine is mostly regulated by intervertebral disc. (1) Translational motion in the long axis of the spine (2) Rotary motion about a vertical axis (3) Antero-posterior bending and (4) Lateral bending permits the motion of vertebral column. Lateral flexion and rotation restrict by the zygapophyseal facets orientation from L1 to L4 (Srivastava et al., 2018).

When lumbar spine is flexed the degree of rotation is shorter than the neutral position. Lumbar zygapophyseal facets orientation helps in forward flexion and backward extension. Lumbosacral joint is responsible for the majority of the flexion though range of flexion varies between the interspaces of lumbar vertebra such as 80 degrees at L1/L2, 90 degrees at L2/L3, and 120 degrees at L3/L4 and L5/S1 (Srivastava et al., 2018). Basic treatment is given by mainly non-steroidal anti-inflammatory medications (NSAIDs), muscle relaxants, and narcotic analgesics for back pain. In one study of primary care, 69% were given non-steroidal anti-inflammatory drugs, 35% muscle relaxants, 12% opioids, and 4% acetaminophen, while 20% were given no medication in patients with Prolapsed Lumbar Intervertebral Disc. Paracetamol is given as first line drug while NSAIDs used as a second choice for the treatment of acute PLID. A brief course of muscle relaxants, either alone or in combination with NSAIDs, may be considered in case of paracetamol or NSAIDs failure (Tulder et al., 2017).

To treat Prolapsed Lumbar Intervertebral Disc exercise is recommended by performing repeated either by voluntary dynamic movement or static muscular contractions (in each case, either "whole-body" or "region-specific," and with or without external loading). It should be overseen or "prescribed". (Koes et al., 2020). Several studies shown that exercise regimens can be beneficial to the persons with non-specific Prolapsed Lumbar Intervertebral Disc pain and disability. (Swinkels et al., 2019). In 2018, According to the research of Aqsa Mobeen et al. (2018), Among 44 patients, 27 were males and 17 were females whose mean age was  $42.45 \pm 12.38$  years mostly complains common disc bulge at the level of L4-L5 (31.82%). Majority

of them were housewives (27.27%) working less than 12 hours. 79.55% were experiencing pain form more than one year. The most probable causes are bearing weight in spine, incorrect motor skills and bad posture. In the clinical cases of herniated disc, there are three pathological syndromes: vertebral syndrome, comprising pathological changes and the adoption of an antalgic posture as a result of the pain syndrome; neurological syndrome, characterized by affecting one or more roots, most often these are L5 and S1 and pain syndrome-local pain which can be constant, burning or root with distal radiation to the limb along the respective dermatome are found. The effect of low back pain that occurs with aging includes cognitive impairment and depression. Sedentary lifestyle, inadequate knowledge and prophylaxis of its treatment are the major risk factor for LBP (Hoy et al., 2019). Some studies have shown that the definite causes of low back pain is idiopathic though some risk factor has been identified such as- heavy manual work, repetitive bending, twisting, lifting, pulling & pushing, forceful movements, static postures like prolonged sitting and awkward postures (Roffey et al., 2019).

Pain in the lumbo-sacral portion of the spine is termed as PLID extending between the first lumbar vertebra and the first sacral vertebra which includes lordotic curve occurs. (Phansopkar & Kage, 2022). Most common symptoms people complain according to Rhon & Fritz (2015) is LBP which tops the worldwide burden of diseases on society. Over 20% of the population in Bangladesh each year between the ages of 30 and 60 is suffering from chronic back pain which shows negative impact on individual health, work, and everyday activities. In United Kingdom back pain is the most common cause of disability and inability. 60% to 80% of the world's population has had at least one episode of Prolapsed Lumbar Intervertebral Disc among them 45% to 55% of adults develop Prolapsed Lumbar Intervertebral Disc and about 62% of previously experienced LBP patients would still be in pain which decrease in people's lifestyle and physical activity one of the major causes of disability. LBP affects people of all ages including infants to the elderly (Fatima, 2016).

People with low back discomfort have physical and mental health issues as well as impact on work performance and social responsibilities, such as family life, healthcare expenditures. Prevalence of low back pain globally in the adult population found it to be around 12%, with a one-month prevalence of 23%, a one year prevalence of 38%, and a lifetime prevalence of nearly 40% which is expected to rise

alarmingly in next decade (Manchikanti et al., 2017). In order to assess the rising prevalence of low back pain and the impact of comorbid conditions and rising costs studies have been conducted. Based on the available studies, prevalence of low back pain, as well as numerous modalities and their use in managing low back pain, is increasing. Risk factors are comorbid mental disorders and a variety of restorative difficulties, such as obesity, smoking, lack of activity, advancing age, and way of life variables. Around 80% to 90% of patients recover in around a month and a half, even though with treatment 5% to 10% of patients experiencing persistent back pain, is generally known as the condition tends to backslide and most patients encounter different scenes years after the underlying assault (Manchikanti et al., 2017). International classification of functioning, disability, and health (ICF) has now recognised as activity and activity limitation, which previously knowns as difficulties performing, accomplishing, or completing a task. Difficulty refers to all of the factors that can influence how an activity is completed when there is qualitative and quantitative change in the activity. (WHO, 2019).

At CRP risk factor about PLID among LBP patient are trying to find out by questionnaire related to PLID and Oswestry index questionnaire. Patients lifestyle, general health and history of surgery and treatment are discussed in sociodemographic portion. Patients condition in their workplace, their working position and their limitation in workplace are also measured. The disability score of LBP patients and also used to find out the risk factors of PLID among LBP patients is measured by Oswestry index questionnaire. The definition of low back pain is used to measure prevalence. Ozgule et al. (2016) recorded if the prevalence in the previous 6 months was 8% when low back pain was defined as requiring sick leave whereas when it was defined as pain lasting at least a day, prevalence was 45% which make the differentiation difficult. About 10–15% develop chronic symptoms who have acute low back pain. A cohort study by Henschke et al. (2018) showed that about a third of patients had not recovered fully after 1 year, again whose pain persists over 3 months, only about 40% recovered within 12 months. LBP shows recurrence although studies show some different results. Costa Lda et al. (2019) found that most episodes of low back pain are self-limiting and not related to serious diseases. A clinician's primary aim should be identify the patients with

specific underlying conditions or with life-threatening disorders—or nerve root pain, from the patients who have non-specific mechanical low back pain.

Fardon et al. (2019) found that low back pain is the leading causes of disability where injury or degeneration of intervertebral discs (IVDs) in the spine can cause disability. Complex biomechanics of human movement is related to proper positioning of IVD. A series of intervertebral discs and vertebrae comprises spinal column which extends from base of the skull to the coccyx which is typically divided into five parts: the cervical region (C1-C7), the thoracic region (T1-T12), the lumbar region (L1-L5), the sacral region (S1-S5), and the coccygeal region (Co1-Co4/5). Flexibility and mobility of the body and the protection of the spinal cord is given by spinal column. Shock-absorbing cushions and support to spinal column is given by intervertebral disc against the axial loading. The intervertebral disc has two components: a nucleus pulposus (which is the inner part) and an outer annulus fibrosus (AF) where the nucleus pulposus is consists of collagen (type II) and makes up 20 percent of the dry weight of the disc as well as numerous proteoglycans which regulate hydrostatic pressure by retaining water (Zielinska et al., 2021). Other ingredients are water and chondrocyte like cells which helps the nucleus pulposus remain elastic, capable of absorbing compression, and flexible under stress forces. On the other hand, the annulus fibrosus is made up of collagen type I, which forms a fibrous tissue around the nucleus pulposus and attached to the vertebral body by Sharpe fibre discovered by Omid-Kashani et al. (2016). Loss of hydration in the nucleus pulposus caused by degenerative changes in the intervertebral discs also reducing IVD height. Jordan et al. (2009) found that this leads to a greater load transfer to the surrounding annulus fibrosus (AF) creating microstructural damage in the fibres which develop into bigger tears over time. Stability of the IVD and change the normal position of the nucleus causing bulging caused by defects in the AF and IVD herniation in severe cases. Amin et al. (2017) discovered that low back pain and sciatica is caused by degenerative spinal diseases such as- IVD herniation. Randolph et al. (2006) found that IVD herniation is the localized or focal displacement of IVD material beyond the limits of the IVD space affecting approximately 1–3% of the general population, with 15–20% of surgical intervention including microdiscectomy, lumbar fusion, prosthetic IVD replacement (total disc replacement), and several other minimally invasive approaches.

Gonzalez-Fiol, (2018) discovered that intervertebral disc pathology such as disc herniation occurs when either part of the nucleus pulposus protrudes through the annulus fibrosus which is caused by chronic herniation eg, disc degeneration occurring due to reduced proteoglycan content where the nucleus pulposus is weakened due to loss of hydration. On the other hand, acute herniation can occur by the result of trauma causing the nucleus pulposus to extrude through a defect in the annulus fibrosus. Risk factor include many genetic, mechanical and behavioural factors. MRI is done as the first choice of investigation method which allows disc herniation to be classified according to the shape and extent and distinguishes three types, (De Decker & Fenn, 2018) protrusion (largest diameter of the disc material projecting beyond the normal margin of this disc is narrower than the general width of the base), extrusion (characterized by a base length less than the height), and sequestration (a subtype of extrusion, which occurs when there is no connection between the herniated material and the intervertebral disc) and was reported by Rezende et al. (2015) . MRI also reveals disc bulge (which involves more than 25% of the circumference). Prevalence of disc bulge in asymptomatic individuals increases from 30% of those 20 years of age to 84% of those 80 years of age. If herniation become advanced it usually compress neural structure causing pain. (Brinjikji et al. 2015) Due to the biomechanical forces in the flexible parts of the spinal column, the cervical and lumbar regions of spinal column are more susceptible to occurrence of disc herniation. Thoracic disc herniation is much less common (Gonzalez-Fiol, 2018)

The risk factor of disc herniation were aging and mechanical insults including with smoking status, aging, obesity, height, sciatic axial overloading, or occupation had the greatest influence on the presence of intervertebral disc pathology (Feng et al., 2016). Though both obesity and height is considered as risk factor, height has shown rarely an involvement. In 2019, it was believed that work-related mechanical factors like heavy physical loading, lifting, bending, and twisting can cause lumbar degeneration (Videman & Battié, 2019). Environmental, i.e., mechanical and behavioural, factors associated with occupation (physical workload, hard work, a working period longer than eight hours, and stress at work) are associated with intervertebral disc pathology (Ahsan et al., 2019). Environmental factors of intervertebral disc pathology being studied solely excluding genetic factor involvement to determine the risk factors. Study found that men who drove a motor vehicle for half or more of their working

time were three times more vulnerable to acute lumbar herniation than other people not assuming the correlation of genetic factor involvement. Another study said that nutritional decline of the central disc is responsible for the degeneration of intervertebral disc and suggested because it leads to collection of waste products, the degeneration of matrix molecules, and a fall in pH, which may cause cell death. Later studies have found that polymorphisms or mutations among genes also accelerated the degeneration of intervertebral disc.

A 2022 study, Environmental factors such as age, gender, cigarette smoking, exposure to vehicular travel, and occupation are always considered as the leading risk factor while correlation of genetic factor has less importance (Buckwalter, 2022). New genetic and proteomic tools have allowed the relation with genetic variation to be researched and made it possible to link genetic variations with the occurrence of different diseases and molecular-level processes to pathologies such as disc herniation. (Pelle et al., 2016)

A case-control study of finds BMI, smoking index, level of education, occupation, socio-economic status, intensity of physical labour at home and work, and self-assessed limitation in physical activity as the risk factor for herniated disc in the lumbar region. Hereditary factors were found to be strongly associated with disc herniation after the research carried out on the people of Croatian Island hence as isolated populations appear to be valuable for detecting such effects due to decreased genetic and environmental variability. Findings shows that occurrence of lumbar intervertebral disc herniation is not readily depend on environmental factors, such as level of education cardiovascular morbidity, smoking status, intensity of physical work, or socio-economic status (Saftić et al., 2016). So, it is very common for low back pain patients to have PLID. The point of this study to find out the risk factors of lumbar disc herniation among low back pain patient.

Mechanical low back pain refers to back pain that arises intrinsically from the spine, intervertebral disks, or surrounding soft tissues. This includes lumbosacral muscle strain, disk herniation, lumbar spondylosis, spondylolisthesis, spondylolysis, vertebral compression fractures, and acute or chronic traumatic injury (George et al., 2020). Repetitive trauma and overuse are common causes of chronic mechanical low back pain, which is often secondary to workplace injury. Most patients who experience

activity-limiting low back pain go on to have recurrent episodes. Chronic low back pain affects up to 23% of the population worldwide, with an estimated 24% to 80% of patients having a recurrence at one year (Kim et al., 2017). Medicare expenditures for patients with low back pain have increased dramatically, with large increases in spending on epidural corticosteroid injections and opiate prescriptions (62.9% and 42.3% increases, respectively), as well as increased use of magnetic resonance imaging and spinal fusion surgery, without any significant improvement in patient outcomes or disability rates (Wang, Kim, Maltenfort, & Ilyas, 2017).

The history and physical examination, with appropriate use of imaging, can point toward a specific etiology. However, the complexity and biomechanics of the spine make it difficult to identify a specific anatomic lesion, with a precise diagnosis made in only 20% of cases (Will, Bury, & Miller, 2018). Evaluation of low back pain should begin with a history and physical examination, the results of which dictate further evaluation or treatment. The presence of red flags that suggest systemic disease or urgent problems warrants additional evaluation before empiric treatment. A systematic review showed a higher likelihood of fracture with the presence of one or more red flags for trauma (older age, prolonged corticosteroid use, significant trauma relative to age, contusions or abrasions). History of malignancy had the highest posttest probability for detection of spinal malignancy (Smith et al., 2022). Other important red flags include constitutional symptoms for malignancy or infection, loss of bowel or bladder function and progressive motor or sensory loss for cauda equine syndrome, and history of a spinal procedure or intravenous drug use for infection (Roscoe, & Nishihira, 2016).

Physical examination should include evaluation of strength, sensation, and reflexes of the lower extremities. Inspection, palpation, and range-of-motion testing of the lumbosacral musculature are helpful for identifying point tenderness, restriction, and spasm. The straight leg raise test is performed by the examiner raising the patient's straight leg to an angle of 30 to 70 degrees. Ipsilateral leg pain at less than 60 degrees is positive for lumbar disk herniation (sensitivity = 0.80, specificity = 0.40; positive likelihood ratio = 2.0, negative likelihood ratio = 0.5). Reproduction of contralateral pain using the crossed straight leg raise test is positive for lumbar disk herniation (sensitivity = 0.35, specificity = 0.90; positive likelihood ratio = 3.5, negative likelihood ratio = 0.72).<sup>7</sup> Patients with psychosocial symptoms or risk factors may be



assessed for nonorganic or inappropriate physical signs (Elumalai, Thangamani, Sanyal, & Kanagarajan, 2016).

### 3.1 Study Design

It is an unmatched (1:1) case control study design used for identifying the risk factors of development of PLID for the patient attended at CRP. People with low back pain due to PLID were selected as case and people with low back pain due to others musculoskeletal causes were selected as control.

### 3.2 Study site

Musculoskeletal unit of the Centre for the Rehabilitation of the Paralyzed (CRP) - Savar, Dhaka

### 3.3 Study population and sample population

The study populations was the people who had low back pain where case population was low back pain due to PLID and control population was those who came to musculoskeletal department of CRP to receive treatment for low back pain due to other musculoskeletal causes.

### 3.4 Sampling technique

In the study researcher conveniently collected samples for both case and control groups because considering the eligibility criteria and the number of patients coming to musculoskeletal unit: it was difficult to find the expected number of subjects. This technique has more feasible, less time consuming and expensive to obtain relevant information. Data was then collected through face to face interview by two intern physiotherapists' of musculoskeletal unit of CRP, Savar, Dhaka.

### 3.5 Sample size

Sample size estimation formula for Case-control study is-

$$n = \frac{(r + 1)}{r} \times \frac{p(1 - p)(Z_{1-\beta} + Z_{1-\alpha/2})^2}{(p_1 - p_2)^2}$$

n = Desired number of samples

r = 1 (Control to case ratio; 1 if researcher chosen same number of subject in both groups)

p<sub>1</sub> = 4.8% = 0.048 (Panhwar et al., 2021) (Prevalence of PLID) (Case group)

$p_2 = 18.5\% = 0.185$  (Majumder et al., 2022) (Prevalence of LBP) (Control group)

$p =$  Proportion of population  $= (p_1 + p_2)/2 = 0.117$

$Z_{1-\beta} = 0.84$  (Considering 80% power for desired sample calculation)

$Z_{1-\alpha/2} = 1.96$  (At 95% CI or 5% type I error, it is 1.96)

$$\begin{aligned} \text{Then, the calculation is } n &= \frac{(1+1)}{1} \times \frac{0.117(1-0.117)(0.84+1.96)^2}{(0.048-0.185)^2} \\ &= 2 \times \frac{0.80996}{0.01877} \\ &= 86.30 \approx 87 \end{aligned}$$

Therefore, researcher was supposed to take a minimum of 87 subjects in case as well as in control group. But due to time limitation and others issues, researcher were able to collect 60 participants data for analysis where 30 participants with low back pain due to PLID were in case group and 30 participants with low back pain due to other musculoskeletal causes were in control group.

### **3.6 Inclusion criteria for case**

- Patients with low back pain due to PLID who attended in CRP for treatment as a case.
- All male and female had same priorities.
- All ages was included.

### **3.7 Inclusion criteria for control**

- Patients with low back pain due to others musculoskeletal causes who attended in CRP for treatment as a control.
- All male and female had same priorities.
- All ages was included.

### **3.8 Exclusion criteria for case**

- Patients with other serious associated diseases like spondylolisthesis, spinal tumor etc.
- Subject who have unconscious, cognitive problem diagnosed by physicians.
- Mentally challenged people.

### 3.9 Exclusion criteria for control

- Patients with other serious associated diseases like spondylolisthesis, spinal tumor etc.
- Subject who have unconscious, cognitive problem diagnosed by physicians.
- Mentally challenged people.

### 3.10 Data collection methods and tools

Data was collected by direct interview using the self-administered questionnaire. The questions was divided into five sections which almost covered all issues regarding risk factors of PLID including age, sex, occupation, residential area, injury, dominant leg, occupation, smoking, substance abuse etc. Beside this, paper, pen, pencil, comprehensive field note was used as the materials of data collection.

### 3.11 Presentation of the data of a case control study

|                  | <b>Cases</b> | <b>Controls</b> | <b>Total</b>  |
|------------------|--------------|-----------------|---------------|
| <b>Exposed</b>   | a            | b               | a + b         |
| <b>Unexposed</b> | c            | d               | c + d         |
|                  | a + c        | b + d           | a + b + c + d |

### 3.12 Interpreting ODDs ratio

- $OR = 1$ : Odds of exposure among cases and controls are same. Exposure is not associated with disease.
- $OR > 1$ : Odds of exposure among cases are higher than controls. Exposure is positively associated with disease.
- $OR < 1$ : Odds of exposure among cases are lower than controls. Exposure is negatively associated with disease.

### **3.13 Data analysis**

SPSS 20 version was used to analyze data. Data is analyzed in the form descriptive statistics for demographic data. Odds ratio is computed to determine how much risk there is in presence of certain exposure compared to those who does not have that exposure.

**Socio-demographic information****Table 01: Age of the participants**

A total participant with low back pain (30 case) and without low back pain (30 control) was interviewed for this study. Out of the participant the mean age of the participants was  $40.07 \pm 9.528$  and the minimum age was 22 years and maximum age was 62 years.

Among case group, the mean age of the participants was  $43.74 \pm 10.245$  years and according to data view the frequency of PLID was highest in between the 21-40 years that is 51.9% (n=14) case and 72.7% (n=24) control. 44.04% (n=12) case and 27.03% (n=9) control were between 41-60 years, 3.7% (n=1) case and 0% (n=0) control were between 61-80 years. Beside this the mean age of the control group was  $40.53 \pm 11.18$ .

|                                       | <b>Case (%)</b>                      | <b>Control (%)</b>                  | <b>Total (%)</b>                    |
|---------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| <b>Age (mean <math>\pm</math> SD)</b> | <b>43.74 <math>\pm</math> 10.245</b> | <b>37.06 <math>\pm</math> 7.834</b> | <b>40.07 <math>\pm</math> 9.528</b> |
| 21-40 years                           | 14 (51.9%)                           | 24 (72.7%)                          | 38 (63.3%)                          |
| 41-60 years                           | 15 (44.04%)                          | 6 (27.3%)                           | 21 (35.0%)                          |
| 61-80 years                           | 1 (3.7%)                             | 0 (0%)                              | 1 (1.7%)                            |
| <b>Total</b>                          | <b>30 (50%)</b>                      | <b>30 (50%)</b>                     | <b>60 (100%)</b>                    |

## Male and female ratio

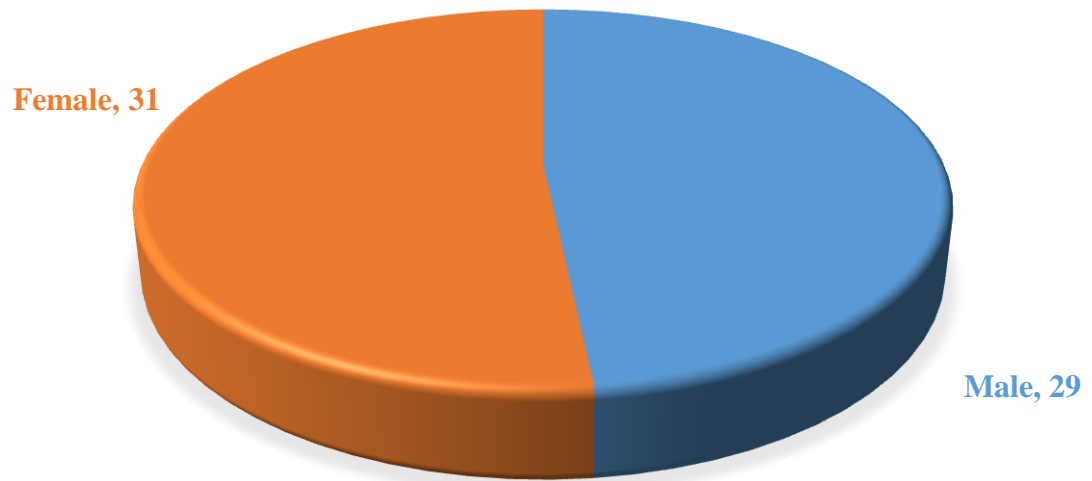


Figure 01: Male and female Ratio

Among the 60 participants 31 were female and 29 were male. In percentage, 51.7% participants were female and 48.3% were male.

**Table 02: Marital Status of the participants**

A total of 60 participants 19 (70.4%) of the cases were married and 8 (29.6%) were unmarried whereas 25 (75.8%) of the controls were married and 8 (24.2%) are unmarried.

| <b>Marital status</b> | <b>Case (%)</b> | <b>Control (%)</b> | <b>Total (%)</b> |
|-----------------------|-----------------|--------------------|------------------|
| Married               | 19 (70.4%)      | 25 (75.8%)         | 44 (73.3%)       |
| Unmarried             | 11 (29.6%)      | 5 (24.2%)          | 16 (26.7%)       |
| <b>Total</b>          | <b>30 (50%)</b> | <b>30 (50%)</b>    | <b>60 (100%)</b> |

**Table 03: Residential area of participants**

A total of 60 participants 16 (59.3%) of the cases were living in rural areas and 11 (40.7%) were living in urban areas whereas 15 (45.5%) of the controls were live in rural areas and 18 (54.5%) were living in urban areas.

| <b>Residential area</b> | <b>Case (%)</b> | <b>Control (%)</b> | <b>Total (%)</b> |
|-------------------------|-----------------|--------------------|------------------|
| Rural                   | 16 (59.3%)      | 13 (45.5%)         | 31 (51.7%)       |
| Urban                   | 14 (40.7%)      | 17 (54.5%)         | 29 (48.3%)       |
| <b>Total</b>            | <b>30 (50%)</b> | <b>30 (50%)</b>    | <b>60 (100%)</b> |



**Table 04: Educational Status of the participants**

Among 30 cases and 30 control there were respectively 55.6% case and 39.4% control have completed SSC or less, 44.4% case and 60.6% control have completed HSC or more.

| <b>Educational status</b> | <b>Case (%)</b> | <b>Control (%)</b> | <b>Total (%)</b> |
|---------------------------|-----------------|--------------------|------------------|
| Complete SSC or less      | 16 (55.6%)      | 13 (39.4%)         | 28 (46.7%)       |
| Complete HSC or more      | 14 (44.4%)      | 17 (60.6%)         | 32 (53.3%)       |
| <b>Total</b>              | <b>30 (50%)</b> | <b>30 (50%)</b>    | <b>60 (100%)</b> |

**Occupation of the participants**

Among the 60 participants, 20 participants were doing hard labor job and 40 participants were doing office work or normal labor.

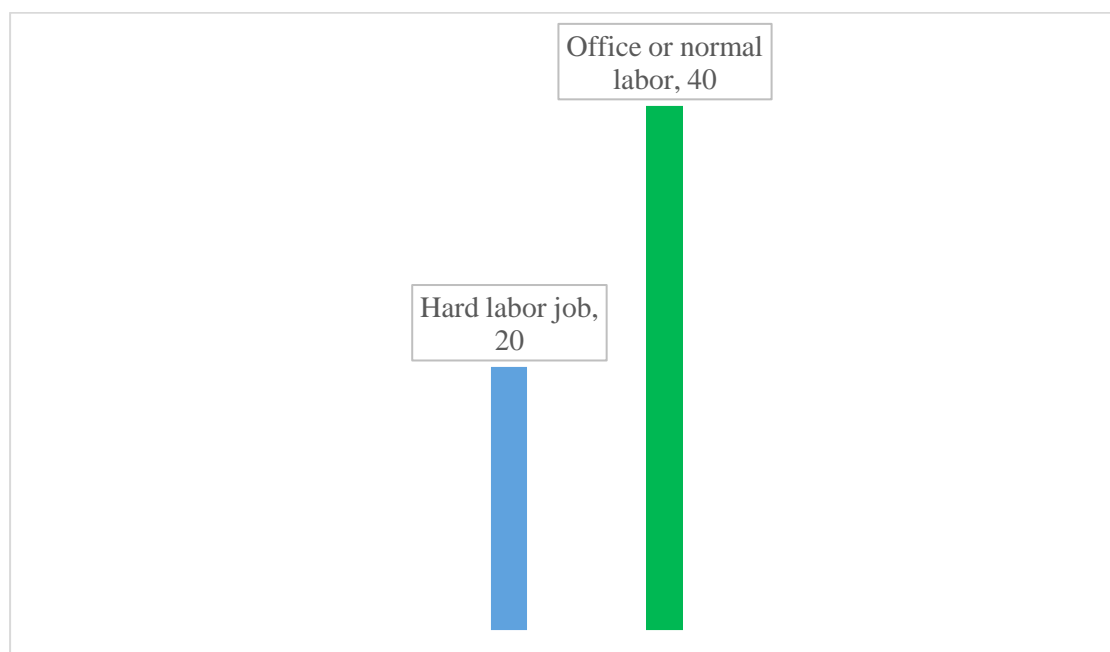


Figure 02: Occupation of the participants

Result showed that, among 30 cases 12 (44.4%) participants were leading their life by doing hard labor job and 15 (55.6%) participants were leading their life by doing office work or normal labor.

### Past medical history of the participants

On result, among the 60 participants, there are 20 (33.3%) participants who have hypertension, 15 (25.0%) participants have Diabetes mellitus, 12 (20.0%) participants have other past medical history and 13 (21.7%) participants have no past medical history.

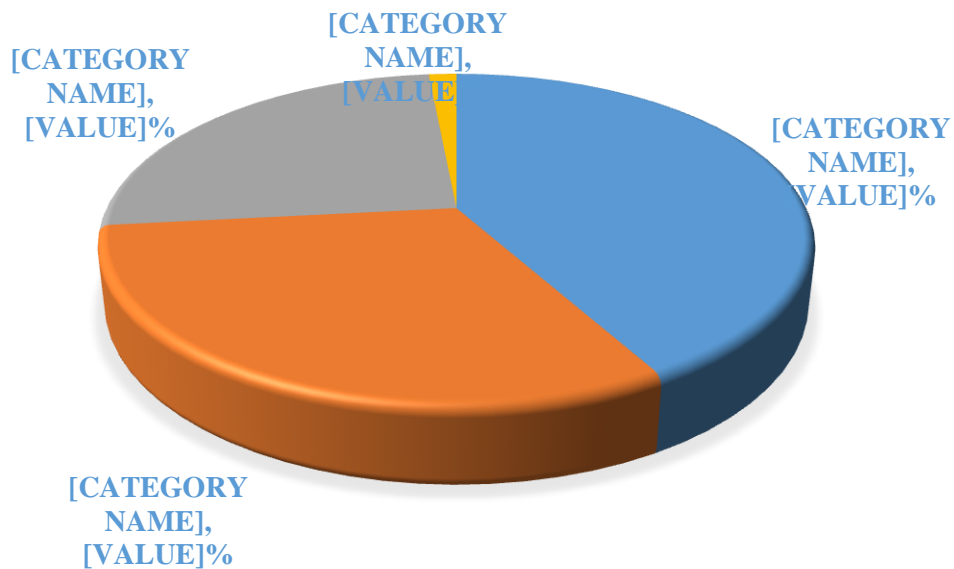


Figure 03: Past medical history of the participants

Among the 27 cases and 33 controls, 11 (40.7%) participants have hypertension, 8 (29.6%) participants have Diabetes mellitus, 4 (14.8%) participants have other history and 4 (14.8%) participants have no medical history in the case groups.

### Risk factors associated with PLID

This study is a case control study and the mode of association between disease and risk factors was Odds ratio. 95% confidence interval was calculated for finding out the significant of the association. If 1 came between the lower bound and the upper bound of confidence interval it was considered as non-significant.

**Table 05: The individual factors of PLID results are shown this table as below-**

| Variable                            |                   | Case | Control | Odds Ratio | 95% CI |        |
|-------------------------------------|-------------------|------|---------|------------|--------|--------|
|                                     |                   |      |         |            | Lower  | Upper  |
| Body mass index                     | More than 25.7    | 16   | 18      | 1.212      | 0.433  | 3.392  |
|                                     | Less than 25.7    | 11   | 15      |            |        |        |
| Family history                      | Yes               | 16   | 19      | 2.612      | 1.49   | 3.87   |
|                                     | No                | 14   | 11      |            |        |        |
| Occupation                          | Hard labor job    | 12   | 8       | 2.500      | 0.832  | 7.511  |
|                                     | Normal labor job  | 15   | 25      |            |        |        |
| Intensity of physical labor at home | Hard labor        | 9    | 7       | 1.857      | 0.854  | 5.902  |
|                                     | Not so hard       | 18   | 26      |            |        |        |
| Intensity of physical labor at work | Hard labor        | 11   | 10      | 1.581      | 0.544  | 4.600  |
|                                     | Not so hard       | 16   | 23      |            |        |        |
| Working position                    | Sitting           | 21   | 24      | 1.313      | 0.400  | 4.303  |
|                                     | Standing          | 6    | 9       |            |        |        |
| Same position at work               | More than 6 hours | 13   | 14      | 1.292      | 0.466  | 3.582  |
|                                     | Less than 6 hours | 18   | 15      |            |        |        |
| Traumatic back injury               |                   | 8    | 4       | 3.053      | 0.805  | 11.569 |
| Lifting heavy weight                |                   | 14   | 8       | 3.365      | 1.123  | 10.081 |

### **Body Mass index**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 16 participants have BMI (body mass index) more than 25.7 and 11 participants have BMI less than 25.7 in the case group. On the other hand, 18 participants have BMI more than 25.7 and 15 participants have BMI more than 25.7 in the control group.

Calculated odds ratio for body mass index is 1.212 which means there was an association between body mass index (BMI) and prolapse lumbar intervertebral disc (PLID). That means 1.212 times more possible chance to occur PLID due to BMI and 95% CI was lower 0.433 and upper 3.392 indicating that this association was significant.

### **Occupation**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 12 participants have doing hard labor work and 15 participants have doing normal labor work in the case group. On the other hand, 8 participants have doing hard labor work and 25 participants have doing normal labor work in the control group.

Calculated odds ratio for occupation is 2.500 which means there was an association between hard or normal labor work and prolapse lumbar intervertebral disc (PLID). That means 2.500 times more possible chance to occur PLID due to occupation and 95% CI was lower 0.832 and upper 7.511 indicating that this association was significant.

### **Intensity of physical labor at home**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 9 participants are doing hard labor work at home and 18 participants are doing normal labor work at home in the case group. On the other hand, 7 participants are doing hard labor work at home and 26 participants are doing normal labor work at home in the control group.

Calculated odds ratio for intensity of physical labor at home is 1.875 which means there was an association between hard or normal labor work at home and prolapse

lumbar intervertebral disc (PLID). That means 1.875 times more possible chance to occur PLID due to intensity of physical labor work at home and 95% CI was lower 0.854 and upper 5.902 indicating that this association was significant.

### **Intensity of physical labor at work**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 11 participants are doing hard labor work at office and 16 participants are doing normal labor at work in the case group. On the other hand, 10 participants are doing hard labor at work and 23 participants are doing normal labor at work in the control group.

Calculated odds ratio for intensity of physical labor at work is 1.581 which means there was an association between hard or normal labor work at home and prolapse lumbar intervertebral disc (PLID). That means 1.581 times more possible chance to occur PLID due to intensity of physical labor at work and 95% CI was lower 0.544 and upper 4.600 indicating that this association was significant.

### **Working position**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 21 participants have doing their work by sitting position and 6 participants have doing their work by standing position in their work place in the case group. On the other hand, 24 participants doing their work by sitting position and 9 participants have doing their work by standing position in their work place in the control group.

Calculated odds ratio for working position is 1.313 which means there was an association between working position and prolapse lumbar intervertebral disc (PLID). That means 1.313 times more possible chance to occur PLID due to working position and 95% CI was lower 0.400 and upper 4.303 indicating that this association was significant.

### **Same position at work**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 13 participants have doing their work for more than 6 hours by same position and 18 participants have doing their work for less than 6 hours by same position in their work place in the case group. On the other hand, 24 participants doing their work by sitting position and 14 participants have doing their work for more than 6 hours by same position and 15 participants have doing their work for less than 6 hours by same position in their work place in the control group.

Calculated odds ratio for same position at work is 1.292 which means there was an association between same position at work and prolapse lumbar intervertebral disc (PLID). That means 1.313 times more possible chance to occur PLID due to maintain same working position at work and 95% CI was lower 0.466 and upper 3.582 indicating that this association was significant.

### **Traumatic back injury**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 8 participants have a history of traumatic back injury and 19 participants have no history of traumatic back injury in the case group. On the other hand, 4 participants have a history of traumatic back injury and 29 participants have no history of traumatic back injury in the control group.

Calculated odds ratio for traumatic back injury is 3.053 which means there was an association between traumatic back injury and prolapse lumbar intervertebral disc (PLID). That means 3.053 times more possible chance to occur PLID due to traumatic back injury and 95% CI was lower 0.805 and upper 11.569 indicating that this association was significant.

### **Lifting heavy weight**

From the table it is observed that the total participants of this study were 60 where 27 were case and 33 were control, among them 14 participants have a history of lifting heavy weight and 13 participants have no history of lifting heavy weight in the case group. On the other hand, 8 participants have a history of lifting heavy weight and 25 participants have no history of lifting heavy weight in the control group.

Calculated odds ratio for lifting heavy weight is 3.365 which means there was an association between lifting heavy weight and prolapse lumbar intervertebral disc (PLID). That means 3.365 times more possible chance to occur PLID due to lifting heavy weight and 95% CI was lower 1.123 and upper 10.081 indicating that this association was significant.

This study identified several risk factors for lumbar intervertebral disc herniation for the low back pain patients in Bangladeshi populations. The prevalence of the history of the low back pain in a random sample of 60 examinees from Centre for the rehabilitation of the paralysed (CRP) was 6.7%, and the comparison of 30 cases with 30 controls revealed that the highest odds ratios were associated with positive family history of lower spine surgery, self-perceived intensity of physical labor at work defined as “hard,” and body mass index of 25.7 or more.

These three risk factors were reasonably independent from each other. Whereas the first captures hereditary factors, the second is entirely environmental, and the third one results from the combination of genetic and environmental factors. The high importance of family history found in this study emphasizes the suitability of isolated populations to detect such effects, as their reduced genetic and environmental diversity enables detecting these effects more easily than in the outbred diverse general population (Rudan et al., 2019).

The study also convincingly showed that factors such as smoking, socio-economic status, level of education, cardiovascular morbidity (assessed through claudication index), and intensity of physical work at home did not contribute significantly to the risk of lumbar intervertebral disc herniation in these populations. For most of these variables, the prevalence of risk exposure was almost exactly the same among the cases and the controls, which in a way controls for confounding effects and implies that the sampling was adequately performed and that the observed positive results of this study are likely to be genuine.

Based on identified risk factors, a simple screening test was devised to assist primary care workers in isolated human populations to identify persons in the community who would be at risk of lumbar intervertebral disc herniation requiring lower spine surgery. A possible concern over the suggested screening test is that screening methods are mainly useful when an intervention is available to reverse the risk. In such individuals, preventive activities (such as exercises for the lumbar spine and lifestyle change) could then be introduced to delay or defer the need for the surgery (Battié, Videman & Parent, 2021). We tested the validity of screening tests based on



the presence of 3, 2, or 1 risk factor. We showed that a very simple screening test, based on presence of any two of these three risk factors, has a sensitivity of 74% and specificity of 82% to detect persons who underwent lower spine surgery because of lumbar intervertebral disc herniation in the population aged 40 years or more. This test could be very useful, as it allows identification of a large majority of the individuals who will develop lumbar intervertebral disc herniation requiring surgery and applying indicated interventions to prevent the need for surgery, without involving many of the individuals who would never have lumbar intervertebral disc herniation.

Effective screening test is of particular public health importance in rural and isolated populations with limited access to secondary and tertiary health care. The incidence of the problem peaks at fifth decade of life (Gusmão, Arantes & Pinheiro-Franco, 2016) with increasing likelihood of the rupture of the posterior ligaments of the spine and herniation of intervertebral disc. The problem decreases with age, as the turgor and elasticity of intervertebral disc are decreased among the elderly (Audat, Al-Omari, Barbarawi, Radaideh & Hajyousef, 2015).

A number of factors could have interfered with the validity of our results. We excluded the examinees who underwent surgery of the lower spine due to other causes (eg, degenerative changes, stenoses) from the cases, although they reflected mere continuum of degenerative spinal disease with disk height changes, herniation, micro-instability, ligamentous hypertrophy, stenosis, and others. However, inclusion of these early changes would greatly reduce the specificity of the case definition and lead to numerous misclassifications. We wanted to investigate only the most severe end of the spectrum in order to reduce misclassification as a potential bias. In addition, the most severe cases were also more likely to reveal the true underlying risk factors and were also of the greatest practical significance in considering a preventive public health action.

Another possible problem is more general relevance and applicability of the findings in our chosen population (rural, isolated). This selection was based on the assumption that hard physical labor underlies much of the episodes of lumbar intervertebral disc herniation at the level of population. We did so despite of the “similarity” in the prevalence of lumbar intervertebral disc herniation surgery in urban and rural areas,

which is likely to be mainly due to a larger number of surgeons available and larger number of surgeries generally performed in urban areas. Therefore, the indication for surgery in urban areas is likely to be more permissive than in rural areas. This is precisely why we chose to undertake our study in the isolated rural area, because the prevalence of the problem is certainly considerably greater there due to their harder physical labor in agriculture and fishery and maintaining difficult bending positions for long periods of time, in combination with the low accessibility of tertiary sector health care. So, it is more useful to have a screening method in rural rather than in urban areas, and the results of our study are not invalidated by the potential confounding factor of health care accessibility in any way.

Besides those general concerns, there are also some more specific ones. A statistically significant investigated variable was based on self-assessment (the intensity of physical labor), and there could be a variation in self-perceived intensity of their work. Furthermore, the second important predictor of lumbar intervertebral disc herniation requiring surgery – positive family history of lower spine surgery, could also reflect shared environment as well as shared genetics, as there may be risky behaviors within a family which were not directly investigated. As for the third significant risk factor (body mass index), a possibility of reverse causality should be considered, ie, that people gained weight and developed higher body mass index as a consequence of restricted activity and altered lifestyle caused by severe lower spinal problems and the surgery. Similar problem does not extend to the fourth significant risk factor, occupation type, as all occupations were recorded as those before surgery.

Our findings are in line with the results of the previous studies of risk factors for lumbar intervertebral disc herniation. It is known that the incidence is greater in men, 12.8 per 1000, as opposed to 6.6 per 1000 in women after the age of 28 years. Body mass index was already considered an important risk factor, although predominantly among men. Hard physical work involving lifting and carrying heavy objects and bending was also proposed as a risk factor (Battié, Videman & Parent, 2016). Injuries of the spine contribute to small structural damage and acceleration of degenerative changes, which increases the risk in persons who had spinal injury. The effect of smoking is controversial, and this study supports the previous studies in which the effect was not noted. The role of genetic factors was also confirmed in twin studies,

where it was assessed that genetic factors contributed at least 20% to the incidence of the disorder (Shiri & Falah-Hassani, 2016).

Long-term postdiscectomy degenerative disc disease and low back pain is a well-recognized disorder; however, its patient-centered characterization and quantification are lacking. We performed a systematic literature review and prospective longitudinal study to determine the incidence of recurrent degenerative back pain and quantify its effect on patients' pain, disability, and quality of life. In a systematic literature review, we found that the short term and long-term proportion of recurrent back pain after primary single-level lumbar discectomy ranged from 3% to 34% and 5% to 36%, respectively. The incidence of recurrent disc herniation was 5.3%. Our prospective, longitudinal PRO study validated these literature review findings, suggesting that when applying an MCID threshold of clinically significant deterioration with validated outcome instruments, as many as one in four patients undergoing discectomy may experience a clinically meaningful recurrence of low back pain and dysfunction. Although as many as 25% of patient in our series experienced worsening back pain and disability by 2 years, their level of low back pain and dysfunction remained better than that experienced at the time of the index disc herniation procedure. Furthermore, none of these patients underwent a fusion procedure or operative intervention for these symptoms at 2 years, although it is possible they may come to attention for these symptoms over the longer term. Schoeggl, Maier, Saringer, Reddy & Matula (2022) demonstrated that 24% of patients experienced persistent or recurrent pain at a mean followup of 7.3 years. Carragee, Spinnickie, Alamin & Paragioudakis (2016) reported an 11% incidence of persistent back or leg pain after limited discectomy and a 23% incidence of persistent back or leg pain after aggressive discectomy. As such, at least some of the variability observed in the literature may be secondary to varying surgical technique.

Although the incidence of recurrent disc herniation is less than that of delayed postoperative back pain, its severity is much greater, and patients required reoperation in the majority of cases. Our study demonstrated that recurrence of back and leg pain at 1- and 2-year follow up led to worse patient-reported outcomes at those followup points. Although not a surprising finding, this is the first study to demonstrate that recurrent/persistent back pain after lumbar discectomy results in an associated decline

in functional status as measured by validated outcome metrics for disability, health utility, and general quality of life.

In an analysis of a systematic literature review and prospective longitudinal outcomes study, the proportion of 2-year, same-level disc herniation requiring revision discectomy was nearly 6% in both analyses. Two-year recurrent low back pain after discectomy may occur in 15% to 25% of patients depending on the level of recurrent pain considered clinically significant. Although delayed recurrent back pain exceeding MCID occurs not infrequently, the level of pain and disability remains less than that experienced at the time of prior disc herniation and index surgery. Despite this, recurrent back pain leads to worse PROs including higher disability and poorer general health state and quality of life as demonstrated by the results of our study. Five- and 10-year follow up studies are needed to further characterize the frequency and severity of post-discectomy degenerative low back pain because this can affect long-term PROs as a result of higher preoperative expectations and lead to poor postoperative satisfaction. In our study, we found that 9% of patients had radiographic same-level recurrent lumbar disc herniation and 6% were symptomatic enough to undergo a reoperation. The values found in our prospective registry for the frequency of same-level recurrent herniation and reoperation fall neatly within the range from 0% to 23% found in our study.

Based on the results obtained, it is reasoned that CLBP produces alterations in spatiotemporal gait parameters analyzed with Op to Gait, resulting in a reduction of contact of both feet with the ground in %, an increase in step length, and a slower gait speed in contrast to healthy subjects. This suggests that the case group takes steps to avoid pain by increasing the length of the step and the duration of the swing phase to reduce foot contact with the ground. This fact prompts an asymmetry between the right and left feet of the same subject as described in other studies (Chang et al., 2019). Sometimes, walking on a treadmill can show results that are different from those obtained through walking on another type of surface, as some studies defend (Casal-Moro, Castro-Menéndez, Hernández-Blanco, Bravo-Ricoy & Jorge-Barreiro, 2021). Adaptive measures are therefore taken in motor control as a protective strategy to avoid pain (Garg, Nagraja & Jayaswal, 2021).

With regard to the significant difference in BMI between groups, a value of 25.25 (3.61) was assessed for the case group (values greater than 25 mg/kg<sup>2</sup> indicates overweight) (Demirel, Onan, Oz, Aslıyuce & Ulger, 2020; Koremans, Chen, Das & Diwan, 2021). Obesity is associated with an increased risk of musculoskeletal diseases such as low back pain (Koremans, Chen, Das & Diwan, 2021). It is a fact that in the case group, the BMI levels presented overweight values which can influence or be a consequence of CLBP because pain limits the development of physical activity. As discussed above, the current trend in approaching CLBP is rehabilitation through exercise that can improve CLBP pain. This fact is considered relevant because gait is part of daily life of the individual, and it is an important physical activity in relation to the maintenance of an optimal state of health (Muchna et al., 2018).

Facet joint has been implicated as the cause of chronic pain in the lower back due to the possible patho-anatomical mechanism (Schoeggl, Maier, Saringer, Reddy & Matula, 2022). The prevalence of facet joint pain was estimated as high as 75% among people reporting low back pain (LBP) (Muchna et al., 2018). In a community-based survey, the prevalence of lumbar facet osteoarthritis reportedly increased with age i.e., 89.2% in persons age more than 60 years, although the association between LBP and osteoarthritis identified by computed tomography was not apparent (Garg, Nagraja & Jayaswal, 2021). The assumed characteristics of acute facet joint pain include local, unilateral, decreased motions in extension and rotation, occasionally pain extending to thigh, no neurologic signs, and aggravation of pain in flexion, sitting, coughing or sneezing, and no antalgic posture. The clinical indicators of LBP with facet joint origin have been consensus by an expert panel and suggested to make the patients more homogeneous and appropriate for investigating effect of spine interventions (Koremans, Chen, Das & Diwan, 2021)

Decreased lumbar motions, as well as an increased pain and disability are the main impairments in patients with chronic LBP including ones with facet joint origin. The possible mechanism is the forces on articular facets which could stretch the joint capsules and the sinu-vertebral capsular nerve might be irritated and provoking muscular guarding (Bagagiolo, Rosa, & Borrelli, 2022). Joint inflammation, degeneration and trauma are then associated with pain during movement, and lead to movement and functional limitation (Shiri & Falah-Hassani, 2016). A variety of

manual and exercise techniques are used in clinics to solve these complaints with little evidences on movement improvement. A study was conducted previously to test the effect on the kinematic of osteopathic manipulative treatment combined with specific exercise in patients with chronic LBP (Khruakhorn et al., 2018).

The study finding warrant caution when interpreting and generalizing the observed factors responsible for PLID among low back pain patients in both case and control group.

First, the study had a limited number of low back pain patients recruited from a single geographical location. Therefore, future multicentre trials with a larger number of patients are needed to confirm our study results.

Second, there was a lack of follow-up of patients to find out if improvement was carried over.

Third, the functional status of the patients was not assessed following intervention. Future studies should assess the long-term effects of low back pain rehabilitation on the level of falls self-efficacy and of re-integration into the community of patients with low back pain.

Fourth, researcher has taken help from one assessor for data collection purpose, it may vary result. Data was collected from one clinical setting CRP Savar, it can influence the result. Sometimes treatment sessions were interrupted due to public holiday mistaken in appointment schedule may interrupt the result.

**7.1 Conclusions**

A very straightforward set of parameters can be used to predict the occurrence of lumbar disk herniations that are severe enough to necessitate lower spine surgery. Through primary healthcare, this kind of screening could lessen the need for surgery in remote regions. Using a fairly basic set of parameters, this study demonstrated that lower intervertebral disc herniation requiring surgical treatment might be somewhat anticipated in advance. These criteria are based on three known risk factors (a positive family history, physically demanding profession, and a body mass index of 25.7 or higher), and this screening could lessen the need for surgery in remote regions through primary healthcare prevention. In conclusion, the different effects between MET and LSE were not found in this pilot study though attempting to include only patients with suspected pain of facet joint origin. Although this study showed statistically a significant increase of the active side-bending ROM to the painful side, as well as the decreases of the pain and disability levels, the results should be interpreted with care. The major limitation of considerably small sample size might lead to the insignificant different results. The study also monitored only immediate effect which does not reject the usual treatment program.

**7.2 Recommendation**

Some further steps that might be taken for future research. A double blinded randomized clinical trial is recommended with large sample size. And the researcher recommended the following things will cover future research. Regarding this area functional outcome and gait analysis tools should be included. Follow up session should be involved in future studies. Although this study presumed better trunk muscle activity with selective trunk muscle training on a physio ball, it was not studied using surface electromyography (sEMG). Analyzing the efficacy of a similar rehabilitation program on trunk muscle activity by means of sEMG may be the choice for future research. Further studies should be focused on long-term treatments and the evaluation with a larger sample size.



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## Appendix – A

### Institutional Review Board (IRB) Letter



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)  
**Bangladesh Health Professions Institute (BHPI)**

(The Academic Institute of CRP)

Ref:

CRP/BHPI/IRB/10/2022/666

Date:

25/10/2022

To  
Masud Ur Rahaman  
M.Sc. in Physiotherapy  
Session: 2020-2021, DU Reg No.: 3476  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

**Subject:** Approval of the thesis proposal “Risk factors behind PLID among the low back pain patients attended at CRP: A case control study” by ethics committee.

Dear Masud Ur Rahaman,  
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. The Following documents have been reviewed and approved:

| Sr. No. | Name of the Documents |
|---------|-----------------------|
| 1       | Dissertation Proposal |
| 2       | Consent form          |
| 3       | Research questioner   |

The purpose of the study is to identify the risk factors behind PLID among the low back pain patients by ensuring the current and available evidence. Should there any interpretation, typo, spelling, and grammatical mistake in the title, it is the responsibility of investigator. Since the study involve questionnaire that may take 25 to 30 minutes and have no likelihood of any harm to the participants. Data collector will receive informed consents from all participants; the members of the Ethics committee approved the study to be conducted in the presented form at the meeting held at 09.00 AM on 24th September 2022 at BHPI.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring during the study, any revision in the protocol 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  
Associate Professor, Dept. of Rehabilitation Science  
Member Secretary, Institutional Review Board (IRB)  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404

E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd, www.crp-bangladesh.org

## Appendix- B

### Application for Data collection

#### Permission Letter

Date: 29 October , 2022

To ,  
The Head of the Department of Physiotherapy,  
Centre for the Rehabilitation of the Paralysed (CRP),  
CRP-Chapain, Savar, Dhaka-1343.  
Through: Head of the 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 Masud Ur Rahaman, student of M.Sc. in Physiotherapy Part-II at Bangladesh Health Professions Institute (BHPI). The Ethical committee has approved my research project entitled: **“Risk factors behind PLID among the low back pain patients attended at CRP: A case control study”** under the supervision of Prof.Md.Obaidul Haque, Vice Principal, BHPI. I want to collect data for my research project from the Outpatient Musculoskeletal Unit, Department of Physiotherapy at CRP. So, I need permission for data collection from the honorable Head, Department of Physiotherapy, CRP, Savar. 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.

Yours Obediently,

  
29.10.22  
Masud Ur Rahaman

Part II M.Sc. in Physiotherapy

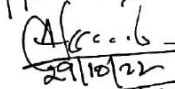
Reg No:

Session: 2020-21

Bangladesh Health Professions Institute (BHPI)

CRP-Chapain, Savar, Dhaka-1343.

Recommended  
  
29.10.22

Approved  
  
29/10/22

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

## Appendix- C

### অনুমতিপত্র (বাংলা)

(অংশগ্রহণকারীকে পড়ে শোনাতে হবে)

আসসালামু আলাইকুম,

আমি মাসুদ-উর-রহমান, আমি “সিআরপি-তে অংশ নেওয়া কোমর ব্যথা রোগীদের মধ্যে পিএলআইডির ঝুঁকির কারণঃ একটি কেস কন্ট্রোল স্টাডি” এই শিরোনামে এম এস সি ইন ফিজিওথেরাপি প্রোগ্রামের এর জন্য একটি গবেষণা করছি। এই গবেষণার মাধ্যমে আমি কোমর ব্যথা রোগীদের পিএলআইডির ঝুঁকির কারণগুলো দেখতে চাই। এখন আমি আপনাকে ব্যক্তিগত তথ্য, চাকুরীর বিস্তারিত তথ্য এবং যদি কোন ব্যাধি থাকে তবে সে বিষয় সম্পর্কে কিছু প্রশ্ন করতে চাই। এতে মোটামুটি ১৫ – ২০ মিনিট লাগবে।

আমি আপনাকে অবহিত করতে চাই যে, এটি একটি সম্পূর্ণ একাডেমিক গবেষণা এবং অন্য কোন উদ্দেশ্যের জন্য এটি ব্যবহার করা হবে না। আপনার প্রদত্ত সমস্ত তথ্য গোপন থাকবে এবং কোন রিপোর্ট বা প্রকাশনার ক্ষেত্রে এর উৎস গোপন থাকবে।

এই গবেষণায় আপনার অংশগ্রহণ স্বেচ্ছাধীন এবং আপনি কোন নেতিবাচক প্রশ্ন ছাড়াই যে কোন সময় এই গবেষণা থেকে নিজেকে প্রত্যাহার করে নিতে পারবেন। আপনার অধিকার আছে কোন প্রশ্নের উত্তর না দেয়ার বা আপনার পছন্দ মত বা ইচ্ছামত উত্তর দেয়ার।

যদি আপনার এই গবেষণা সম্পর্কে অথবা অংশগ্রহণকারী হিসেবে কিছু জানার থাকে তবে, আপনি আমার সাথে অথবা আমার গবেষণা অধীক্ষক, প্রফেসর মোহাঃ ওবায়দুল হক, উপাধ্যক্ষ, বাংলাদেশ হেলথ প্রফেসস ইন্সটিটিউট (বিএইচপিআই) এর সাথে যোগাযোগ করতে পারেন।

শুরু করার আগে কি আপনার কোন প্রশ্ন আছে?

|       |    |
|-------|----|
| হ্যাঁ | না |
|-------|----|

আমি কি আপনার অনুমতি সাপেক্ষে সাক্ষাৎকার শুরু করতে পারি?

|       |    |
|-------|----|
| হ্যাঁ | না |
|-------|----|

অংশগ্রহণকারীর সাক্ষর ও তারিখঃ \_\_\_\_\_

সাক্ষাৎকার গ্রহণকারীর সাক্ষর ও তারিখঃ \_\_\_\_\_

ফিজিওথেরাপিস্টের সাক্ষর ও তারিখঃ \_\_\_\_\_

## CONSENT STATEMENT

Assalamualaikum,

I am Masud-Ur-Rahaman, conducting this thesis for the fulfillment of my M.Sc. in Physiotherapy entitled “**Risk factors of PLID among the low back pain patients attended at CRP: A case control study**”. By this I would like to find out the risk factors of PLID among low back pain patients attended at CRP. Now I need to ask some information regarding sociodemographic, balance and trunk impairment related question. This will take approximately 20-30 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. Your participation in the research will have no impact on your present or future treatment in this area. All information provided by you will be treated as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study or your right as a participant, you may contact with me and/or my research supervisor, Prof. Obaidul Haque, Vice Principal, BHPI, CRP, Savar, Dhaka.

Do you have any questions before I start?

|     |    |
|-----|----|
| Yes | No |
|-----|----|

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

|     |    |
|-----|----|
| Yes | No |
|-----|----|

Signature and date of the Participant \_\_\_\_\_

Signature and date of the Interviewer \_\_\_\_\_

Signature and date of the Physiotherapist \_\_\_\_\_

## Appendix- D

শিরোনাম: সিআরপি-তে অংশ নেওয়া কোমর ব্যথা রোগীদের মধ্যে পিএলআইডি'র ঝুঁকির কারণঃ একটি কেস কন্ট্রোল স্টাডি

### সেকশন-১: ব্যক্তিগত তথ্য

মূল্যায়ন এর তারিখঃ

রোগীর আইডিঃ

নামঃ

ঠিকানাঃ

ফোন নম্বরঃ

### সেকশন-২: সোসিও-ডেমোগ্রাফিক তথ্য

অনুগ্রহ করে সঠিক উত্তরে টিক (০০) চিহ্ন দিনঃ

| নম্বর | প্রশ্নাবলি                              | অংশগ্রহণকারীর প্রতিক্রিয়া  |
|-------|---|---|
| ২.১   | বয়স (বছরে)                             |   |
| ২.২   | লিঙ্গ                                   | <input type="radio"/> পুরুষ = ০<br><input type="radio"/> মহিলা = ১  |
| ২.৩   | উচ্চতা (মিটার)                          |   |
| ২.৪   | ওজন (কেজি)                              |   |
| ২.৫   | বডি মাস ইনডেক্স (বিএমআই)                | <input type="radio"/> ২৫.৭ এর বেশি = ০<br><input type="radio"/> ২৫.৭ এর কম = ১  |
| ২.৬   | বৈবাহিক অবস্থা                          | <input type="radio"/> বিবাহিত = ০<br><input type="radio"/> অবিবাহিত = ১<br><input type="radio"/> তালাকপ্রাপ্ত = ২<br><input type="radio"/> বিধবা = ৩  |
| ২.৭   | শিক্ষাগত অবস্থা                         | <input type="radio"/> এস এস সি সম্পূর্ণ করেছেন বা তার কম = ০<br><input type="radio"/> এইচ এস সি সম্পূর্ণ করেছেন বা তার বেশি = ১                       |
| ২.৮   | বাসস্থান এর এলাকা                       | <input type="radio"/> গ্রামীণ = ০<br><input type="radio"/> শহর = ১<br><input type="radio"/> পাহাড়ি = ২   |
| ২.৯   | পেশা                                    | <input type="radio"/> কঠোর শ্রমের কাজ = ০<br><input type="radio"/> অফিস বা সাধারণ শ্রমের চাকরি = ১  |
| ২.১০  | অতীতে গ্রহণ করা চিকিৎসা                 | <input type="radio"/> উচ্চরক্তচাপ = ০<br><input type="radio"/> ডাইবেটিস = ১<br><input type="radio"/> হৃদরোগ = ২<br><input type="radio"/> অন্যান্য = ৩ |
| ২.১১  | পিএলআইডি সনাক্তকরণ                      | <input type="radio"/> এম আর আই = ০<br><input type="radio"/> এক্স রে = ১   |
| ২.১২  | পরিবারে মেরুদণ্ডের অস্ত্রোপচারের ইতিহাস | <input type="radio"/> হ্যাঁ = ০<br><input type="radio"/> না = ১   |



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| ২.১৩ | আপনি কি মেরুদণ্ডের নিচের অস্ত্রোপচার করেছেন? | <input type="radio"/> এল৪/৫ বা এল৫/এস১ = ০<br><input type="radio"/> না = ১ |
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সেকশন-৩: পিএলআইডি-এর স্ব-শাসিত বুকি মূল্যায়ন প্রশ্নাবলী

| নম্বর | প্রশ্নাবলি                                    | অংশগ্রহণকারীর প্রতিক্রিয়া   |
|-------|---|--|
| ৩.১   | কর্মক্ষেত্রে শারীরিক শ্রমের তীব্রতা           | <input type="radio"/> কঠোর = ০<br><input type="radio"/> স্বাভাবিক = ১  |
| ৩.২   | বাড়িতে শারীরিক শ্রমের তীব্রতা                | <input type="radio"/> কঠোর = ০<br><input type="radio"/> স্বাভাবিক = ১  |
| ৩.৩   | কাজের পজিশন                                   | <input type="radio"/> বসে = ০<br><input type="radio"/> দাঁড়িয়ে = ১<br><input type="radio"/> ভ্রমন করা = ২  |
| ৩.৪   | কর্মক্ষেত্রে একই অবস্থানে থাকার সময়কাল       | <input type="radio"/> ৬ ঘণ্টার কম<br><input type="radio"/> ৬ ঘণ্টার বেশি   |
| ৩.৫   | আপনি কি পিঠে কোন আঘাত পেয়েছিলেন?             | <input type="radio"/> হ্যাঁ = ০<br><input type="radio"/> না = ১  |
| ৩.৬   | আপনি কি গত দুই সপ্তাহে কোনো ভারী ওজন তুলেছেন? | <input type="radio"/> হ্যাঁ = ০<br><input type="radio"/> না = ১  |
| ৩.৭   | রুউডিকেসন সূচক                                | <input type="radio"/> ব্যথা নেই, টাইটনেস নেই, ক্লান্তি নেই = ০<br><input type="radio"/> ব্যথা নেই, কিন্তু টাইটনেস ও ক্লান্তি আছে = ১<br><input type="radio"/> সামান্য ব্যথা, কিন্তু খুব কম এবং সহনীয় = ২<br><input type="radio"/> মাঝারি ব্যথা, সামান্যের চেয়ে বেশি, কিন্তু তবুও সহনীয় = ৩<br><input type="radio"/> গুরুতর ব্যথা, এটি সত্যিই ব্যথা করে এবং কম সহনীয় = ৪<br><input type="radio"/> অসহনীয় ব্যথা, ব্যায়াম অবিলম্বে বন্ধ করতে হবে = ৫  |
| ৩.৮   | শারীরিক কার্যকলাপের সীমাবদ্ধতা স্ব-মূল্যায়ন  | <p>১. জোরদার ক্রিয়াকলাপ, যেমন দৌড়ানো, ভারী জিনিস তোলা, কঠোর খেলাধুলায় অংশগ্রহণ করা</p> <input type="radio"/> সহনীয় সীমাবদ্ধতা<br><input type="radio"/> অসহনীয় সীমাবদ্ধতা<br><p>২. পরিমিত ক্রিয়াকলাপ, যেমন একটি টেবিল সরানো, ভ্যাকুয়াম ক্লিনার চাপানো, বোলিং বা গলফ</p> <input type="radio"/> সহনীয় সীমাবদ্ধতা<br><input type="radio"/> অসহনীয় সীমাবদ্ধতা<br><p>৩. মুদি জিনিসপত্র তোলা বা বহন করা</p> <input type="radio"/> সহনীয় সীমাবদ্ধতা<br><input type="radio"/> অসহনীয় সীমাবদ্ধতা<br><p>৪. সিঁড়ি দিয়ে কয়েক তলা ওঠা</p> <input type="radio"/> সহনীয় সীমাবদ্ধতা<br><input type="radio"/> অসহনীয় সীমাবদ্ধতা<br><p>৫. সিঁড়ি দিয়ে এক তলা ওঠা</p> <input type="radio"/> সহনীয় সীমাবদ্ধতা<br><input type="radio"/> অসহনীয় সীমাবদ্ধতা |

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|  | <p>৬. ঝুঁকা, হাঁটু গেড়ে বা নত হওয়া</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> <p>৭. এক মাইলের বেশি হাঁটা</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> <p>৮. বেশ কয়েকটি ব্লক হাঁটা</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> <p>৯. এক ব্লক হাঁটা</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> <p>১০. স্নান বা নিজে পোশাক পরিধান করা</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> <p>১১. সামগ্রিক সীমাবদ্ধতা অবস্থা</p> <ul style="list-style-type: none"> <li>○ সহনীয় সীমাবদ্ধতা</li> <li>○ অসহনীয় সীমাবদ্ধতা</li> </ul> |
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**Title: Risk factors of PLID among the low back pain patients attended at CRP:  
A case control study**

**SECTION-1: Personal Details**

Date of assessment:

Patient ID:

Name:

Address:

Contact Number:

**SECTION-2: Socio Demographic Information**

Please give tick (√) mark at the best correct answer:

| No.  | Questions                            | Response of the participant  |
|------|--------------------------------------|--|
| 2.1  | Age (in year)                        |  |
| 2.2  | Sex                                  | <input type="radio"/> Male = 0<br><input type="radio"/> Female = 1   |
| 2.3  | Height                               |  |
| 2.4  | Weight (Kg)                          |  |
| 2.5  | Body Mass Index (BMI)                | <input type="radio"/> Greater than 25.7 = 0<br><input type="radio"/> Less than 25.7 = 1  |
| 2.6  | Marital status                       | <input type="radio"/> Married = 0<br><input type="radio"/> Unmarried = 1<br><input type="radio"/> Divorced = 2<br><input type="radio"/> Widow = 3        |
| 2.7  | Educational status                   | <input type="radio"/> Completed Secondary school certificate (SSC) or less = 0<br><input type="radio"/> Higher secondary certificate (HSC) and above = 1 |
| 2.8  | Living area                          | <input type="radio"/> Rural = 0<br><input type="radio"/> Urban = 1<br><input type="radio"/> Hill tracks = 2  |
| 2.9  | Occupation                           | <input type="radio"/> Hard labor job = 0<br><input type="radio"/> Office or normal labor job = 1   |
| 2.10 | Past medical history                 | <input type="radio"/> HTN = 0<br><input type="radio"/> DM = 1<br><input type="radio"/> Heart Disease = 2<br><input type="radio"/> Others = 3             |
| 2.11 | Identified as PLID by                | <input type="radio"/> MRI = 0<br><input type="radio"/> X-ray = 1   |
| 2.12 | Habit of smoking                     | <input type="radio"/> Yes = 0<br><input type="radio"/> No = 1  |
| 2.13 | Did you undergo lower spine surgery? | <input type="radio"/> L4/L5 or L5/S1 = 0<br><input type="radio"/> No = 1   |

**SECTION-3: Self-administered risk assessment questionnaire of PLID**

| No. | Questions  | Response of the participant  |
|-----|--|--|
| 3.1 | Intensity of physical labor at work              | <input type="radio"/> Hard = 0<br><input type="radio"/> Not so hard = 1  |
| 3.2 | Intensity of physical labor at work              | <input type="radio"/> Hard = 0<br><input type="radio"/> Not so hard = 1  |
| 3.3 | Working positions                                | <input type="radio"/> Sitting = 0<br><input type="radio"/> Standing = 1<br><input type="radio"/> Travelling = 2  |
| 3.4 | Duration of remaining in same position at work   | <input type="radio"/> Less than 6 hours<br><input type="radio"/> More than 6 hours   |
| 3.5 | Did you have any traumatic back injury?          | <input type="radio"/> Yes = 0<br><input type="radio"/> No = 1  |
| 3.6 | Did you lift any heavy weight in last two weeks? | <input type="radio"/> Yes = 0<br><input type="radio"/> No = 1  |
| 3.7 | Claudication index                               | <input type="radio"/> No pain, no tightness, no tiredness = 0<br><input type="radio"/> No pain, but some tightness and tiredness = 1<br><input type="radio"/> Slight pain, but very minimal, very tolerable = 2<br><input type="radio"/> Moderate pain, more than slight, but still tolerable = 3<br><input type="radio"/> Severe pain, it really hurts, it is barely tolerable = 4<br><input type="radio"/> Intolerable pain, exercise must cease immediately = 5   |
| 3.8 | Self-assessed limitation in physical activity    | <ol style="list-style-type: none"> <li>1. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.               <ul style="list-style-type: none"> <li><input type="radio"/> Considerable limitation</li> <li><input type="radio"/> Non-considerable limitation</li> </ul> </li> <li>2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.               <ul style="list-style-type: none"> <li><input type="radio"/> Considerable limitation</li> <li><input type="radio"/> Non-considerable limitation</li> </ul> </li> <li>3. Lifting or carrying groceries               <ul style="list-style-type: none"> <li><input type="radio"/> Considerable limitation</li> <li><input type="radio"/> Non-considerable limitation</li> </ul> </li> <li>4. Climbing several flights of stairs               <ul style="list-style-type: none"> <li><input type="radio"/> Considerable limitation</li> <li><input type="radio"/> Non-considerable limitation</li> </ul> </li> <li>5. Climbing one flight of stairs               <ul style="list-style-type: none"> <li><input type="radio"/> Considerable limitation</li> <li><input type="radio"/> Non-considerable limitation</li> </ul> </li> </ol> |

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|  |  | <p>6. Bending, kneeling, or stooping</p> <ul style="list-style-type: none"><li>○ Considerable limitation</li><li>○ Non-considerable limitation</li></ul> <p>7. Walking more than a mile</p> <ul style="list-style-type: none"><li>○ Considerable limitation</li><li>○ Non-considerable limitation</li></ul> <p>8. Walking several blocks</p> <ul style="list-style-type: none"><li>○ Considerable limitation</li><li>○ Non-considerable limitation</li></ul> <p>9. Walking one block</p> <ul style="list-style-type: none"><li>○ Considerable limitation</li><li>○ Non-considerable limitation</li></ul> <p>10. Bathing or dressing yourself</p> <ul style="list-style-type: none"><li>○ Considerable limitation</li><li>○ Non-considerable limitation</li></ul> <p>11. Overall limitation status</p> <ul style="list-style-type: none"><li>○ Considerable = 0</li><li>○ Non-considerable = 1</li></ul> |
|--|--|---|