RISK FACTORS OF DEVELOPMENT OF LOW BACK PAIN FOR THE PATIENTS ATTENDED AT CRP

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

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Declaration

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

Signature: **Date:**

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Acronyms

ADL	Activities of Daily Living
BHPI	Bangladesh Heath Professions Institute
BMI	Body Mass Index
CI	Confidence Interval
CLBP	Chronic Low Back Pain
CRP	Center for the Rehabilitation of the Paralyzed
LBP	Low back pain
NSAIDS	Non Steroid Anti Inflammatory Drugs
OR	Odd Ratio
ROM	Range of Motion
SLR	Straight Leg Raise
SPSS	Statistical Package of Social Science
USA	United States of America
UK	United Kingdom
WHO	World Health Organization

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Abstract

Purpose: The purpose of the study was to identify the risk factors of development of low back pain for the patient attended at CRP. *Objectives*: To find out the risk factors associated with development of low back pain; to explore the socio-demographic information of the affected group; to determine vulnerable age group of low back pain; to assemble the association between low back pain and possible exposure (previous back injury, working posture, smoking, obesity, lifting heavy object, positive family history, lack of exercise). *Methodology*: A hospital based unmatched (1:1) case-control study was carried out to complete the objectives of the study. 50 participants with LBP were identified from musculoskeletal unit of CRP as case and another 50 healthy people were selected as control. The data was collected by using a structural questionnaire by face to face interview. Data were analyzed through SPSS 16 version. *Results*: The mean age of 100 participants was 41.08 (±11.91). The mean age for case was 42.22 (±13.31) and control was 39.94 (±10.31). Highest frequency (n=15) of the age range was 50-70 years among the case. A total 51% respondent was male and 49% was female. Among the affected participants 46% were male and 54% were female and male female ratio was 1:1.7. 22% of the affected respondents have at least some secondary education. 76% cases and 26% control were from rural area. The factors significantly associated with the development of low back pain were previous back injury (OR 17.25; 95%CI, 5.37-55.46), poor working posture (OR 9.21; 95% CI, 3.42-24.52), smoking (OR 3.5; 95% CI, 1.36-8.99), obesity (OR 16; 95% CI, 3.49-73.41), positive family history (OR 15.79; 95% CI, 5.76-43.35), lack of exercise (OR 0.053; 95% CI, 0.02-0.17), lifting heavy object (OR 8.14; 95% CI, 3.32-19.94), poor sitting posture (OR 11.96; 95% CI, 4.29-33.4). *Conclusion*: The result of the study demonstrates that life style factor and other exposure are associated with the occurrence of low back pain. It is important to take comprehensive preventive measures to address a range of work and life conditions that can be improved to decrease the incidence of low back pain.

Key words: Risk factors, Low Back Pain.

CHAPTER-I: INTRODUCTION

1.1 Background

Low back pain (LBP) is one of the most common and challenging musculoskeletal conditions experienced by people throughout the world (Charoenchai et al., 2006). It is the number one familial reason of activity limitation, the second most frequent cause of doctor's visits and the third most common cause of surgical procedures in USA (Apfel et al., 2010). It has become a great public health problem and is a frequent cause of absenteeism and requires for disabilities pensions. That's why it is called 20th century's disaster (Sparkes, 2005).

In general people LBP isavery common problem that experience at some point in their life (Hoy et al., 2010).Approximately 70-85% population suffers LBP at some point of their lives in USA (Buselli et al., 2011).Tomita et al. (2010) mentioned that in European country the lifetime prevalence of LBP is more than 70%. Lifetime prevalence of LBP was between 51% and 84% where point prevalence ranged between 14% and 42%according to a European review article (Horvath et al., 2010).

LBP is become the thorn in the side of modern medicine. The lifetime prevalence of LBP is 58% in UK and 70% in USA (Peterson et al., 2000).In Alberta and Saskatchewan the lifetime prevalence of LBPis 83.8% among 2400 individuals (Bishop & Wing, 2003).In Canadian studyit was reported that 84% adults experienced LBP during their lifetime. Average prevalence of LBP in UKis 59%, in Denmark 70%, in Finland 75% and in Iran 29.3% respondents reported LBP (Biglarian et al., 2012). However the prevalence rate was greatly higher in developing countries especially in South West Nigeria that is 72% and 64% in China (Fabunmi et al., 2005).

Among adult population LBP is the most common everyday complaint.In Australia about 20% of the adult population experiences LBP at any had given time (Alsaadi et al., 2011). Louw et al. (2007) stated that in Africa the prevalence of LBP is 33% among adolescents and 50% among adults in one year. Hestbaek et al. (2006) mentioned that LBPis as common complaint as in childhood and adolescence that are

seen in adults. A cross-sectional study among 18-year-old females and 20-year-old males showed that the lifetime incidence surpassed 50% in Denmark (Sato et al., 2011).

LBP affects quality of life and is a major reason for work off, early retirement and disability pensions. In Norway and the Western world sick leave and disability pensions are most commonly occur due to LBP. In 1999, 15% of the wholeamount of sick leavesas a result of LBP in Norway(Hoy et al., 2010).In Finlandabout 43% costs of sickness absences have increased due to this from 1995 to 2005 (Rivinoja et al., 2011). In Canada about 5-10% of employee misses work every year due to this (Buselli et al., 2011).

The socioeconomic impact of LBP is significant (Alsaadi et al., 2011).The healthcare and social costs are increasing more rapidly. In United States about one third of all disability dollars spent because of LBP (Kuritzky&Samraj, 2012). The healthcare costs increased 65% between 1997 and 2005 in USA for LBP. Now it is over 70 billion dollars per year in USA (Buselli et al., 2011). In UK it is 17 billion per year (Alsaadi et al., 2011). In 2001, the cost of LBP was $9.17 billion in Australia (Mirtz&Greene, 2005).

LBP is an enormous, complex and devastating condition and socio-economic impactis about more than 20% in Bangladesh. An individual health, employment and activity of daily living are greatly affected due to its harmful effect (Rashid et al., 2012).In USA LBP is the fifth and in Italy LBP is the third most common and costly condition for a medical visit (Ladeira, 2011).

Frymoyer found that moderate LBP had 46.3% and 23.5% had severe LBP while categorized by severity and recurrences are frequent (Garg et al., 2013).Kuritzky&Samraj(2012) mentioned that 2%–7% acute LBP build up as chronic pain unfortunately and cause absenteeism up to 75%–85% of total worker.

CLBP is considered a major public health issue causing disability of the elderly in developed countries (Muraki et al., 2012).It is the second most common cause of disability among US adults. The prevalence of CLBP ranges from 9% to 21% and

disability in CLBP patients varies from 11% to 76%. Moreover it is a complex and multifactorial phenomenon associated with high social and health costs that lead to disability. The high costs are related with productivity losses, leaves of absence from work and health system expenses (Salvetti et al., 2012).

Age is a significant predictor of LBP. The frequency and severity of spinal degeneration increase with aging (Peterson et al., 2000).Plouvier et al. (2011) mentioned that among older people LBP is more frequent and become persistent.In women the prevalence and severity of LBP were higher (Alcouffe et al., 1999). An updated systematic review of global prevalence of LBP showed it is most common among females and persons ages 40–80 years (Hoy et al., 2012). Some studies reported that risk of LBP increases with advanced age and female gender whereas other studies reported no association between these factors (Nagasu et al., 2007).It is highly prevalent among rural people than urban people (Tomita et al., 2010).

It is an important challenge in occupational health settings to identify the etiological factors. In that context numerous studies have investigated factors related to the occurrence of LBP. According to those studies the known modifiable risk factors for LBP are lack of fitness, obesity, smoking, and occupational factors including heavy lifting, twisting, bending, stooping, awkward posture at work and prolonged sitting. Non-modifiable factors are increasing age, number of children, previous episode of LBP, lordosis and major scoliosis (Vindigni et al., 2005).

A lot of misery occurs due to LBP. It is painful for those who suffering from it and is costly for the employers and society (Hoy et al., 2010). Therefore, a prospectivestudy was designed to investigatethe effect of work related factors and individual characteristicson the occurrence of LBP and to assess the relative contribution of eachrisk factor to the occurrence of LBP among exposed workersand among the entire study population.

1.2 Rationale

Low back pain (LBP) is one of the most common health problems all over the world. Approximately 20% of the adult population experiences LBP at any given time and lifetime prevalence is around 80%. It is the number one factor for activity limitation and the second most frequent reason for doctor's visits. In the year 2000 LBP was the most common musculoskeletal problem comprised 50% of all work related disorders. Unfortunately 2%–7% of acute LBP develop chronic pain that accounting for up to 75%–85% of total worker absenteeism. CLBP is responsible for disability in most cases. Disability in CLBP tended to increase with age in both men and women.

LBP has been identified as one of the most frequently and disabling (Garg et al., 2013) and costly condition among the working population in their productive life worldwide (Lis et al., 2007).Approximately 40% adults aged between 20-50 years develop LBP which is the most productive period of a person.The direct costs of medical care for LBP are enormous.In 2002 it was the 2nd most common reason for disability pension (22% of all disability pensions) in Denmark and annual cost estimates is about $8 billion.

Despite many studies the LBP is nowadays still regarded as an enigma. The disorder has a mysterious and intriguing appeal with an apparently spontaneous onset and resolution, inflicting a great deal of suffering on patients over a prolonged period of time. The high costs and work absenteeism are related with productivity losses as a result socio economic impacts are increasing day by day that is more than 20% in Bangladesh.

Identifying risk factors for a disease is one of the methods used to gain understanding of its etiology. In the past decades epidemiological studies have contributed to our understanding of the etiology of LBP. Risk factors for the occurrence of LBP can roughly be divided into: personal factors (e.g. age, smoking habits, physical capacity and body weight), psychosocial factors (e.g. stress, social support and job satisfaction) and physical factors. Among these physical factors, twisting, bending, lifting and whole body vibrations are the most frequently reported ones associated with LBP.

There is a great demand in indentifying the risk factors of LBP to reduce the sufferings of the LBP patients. By conducting this research it is expected that some of these factors can be identified to minimize the cost of treatment, morbidity, absent from work, moreover physical and psychological distress, increase productivity as well as decrease socio economic cost. Ascertain of the risk factors of LBP give us evidence by which we take necessary preventive measure to manage this condition as well as to minimize the sufferings of this condition. The study may helps to build awareness about posture and activities.

Identification of these factors supplements policy development and infrastructure modification, utilizing ergonomical design methods. While collecting data, patients are acknowledged about physiotherapist and their role and thatmay be very helpful in professional development of physiotherapy which is essential for the current situation.

Thus study gives detail information to the patient about LBP so that people can modify their life style regarding LBP and can help to develop a broad health promotion intervention as well as essential advice to the patients. Thus the health and wellbeing of the community people would be improved through prophylactic measure.

1.3 Research Question

What are the risk factors of Low Back Pain?

1.4 Objectives

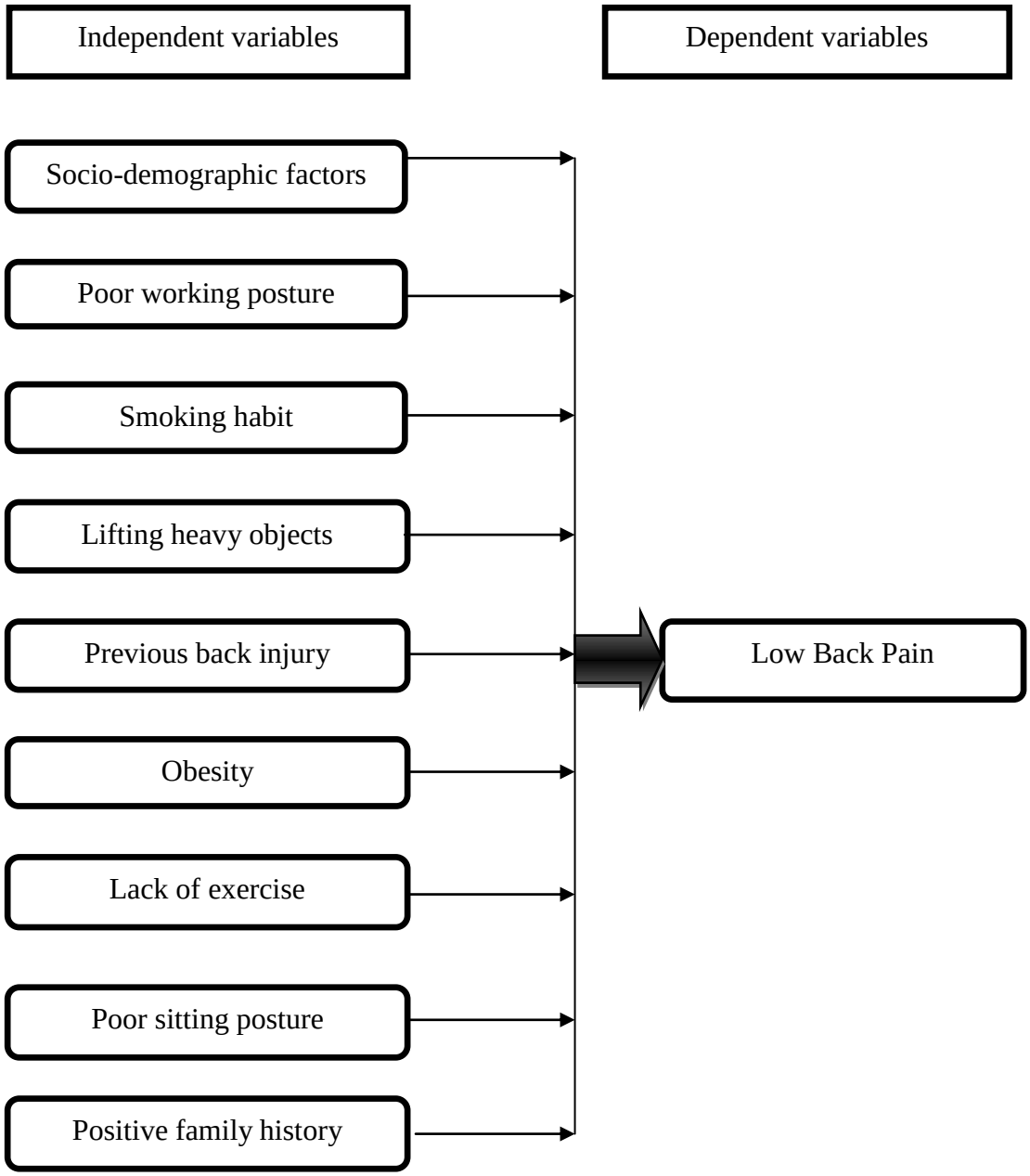
1.4.1 General objective

- To identify possible risk factors associated with low back pain.

1.4.2 Specific Objectives

- To explore socio-demographic (age, gender, occupation, educational status) characteristics of patients with low back pain.
- To identify the association between smoking and low back pain.
- To figure out the link between lifting heavy weight and low back pain.
- To evaluate the association between working posture and low back pain.
- To find out the association between previous lower back injury and low back pain.
- To investigate the association between sitting posture and low back pain.
- To ascertain the link between obesity and low back pain.
- To examine the association between positive family history and low back pain.
- To figure out the link between physical exercise and low back pain.

1.5 List of Variables



1.6 Operational definition

Low back pain

Pain in the lumbosaccral area of the spine encompassing the distance from the 1st lumbar vertebra to the1st sacral vaertebra.

Smoking

Smoke cigarette at least 3 times per day.

Heavy weight lifting

Lifting objects at least 20 Kg or more.

Back trauma

Any remarkable history of having trauma that directly affect the back.

Physical Exercise

Exercise for at least 40 minute3 times per week, example- walking 40 minute 3 times per week.

Poor Sitting Posture

Sitting with lordosed or kyphosed or slouched.

Positive Family History

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

Obesity

Obesity is defined as having BMI of greater than 30 kg/m2.

BMI

BMI was calculated from reported weight and height and categorized as underweight (<20), acceptable (≥ 20 to < 25), overweight (≥25 to ≤ 30) and obese (> 30).

CHAPTER-II: LITERETURE REVIEW

International Association for the Study of Pain defined pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (IASP, 2012). LBP is neither a disease nor a diagnostic entity of any sort referring pain of variable duration in the lower back and it is a pattern of responses to external and internal stimuli (Ehrlich, 2003).

Perhaps LBP more precisely called lumbago or lumbosacral pain that occurs below the 12th rib and above the gluteal folds (Sikiru & Hanif, 2010). According to the European guidelines for management of acute nonspecific back pain in primary care defined LBP is a pain and discomfort localized below the costal margin and above the inferior gluteal folds, with or without leg pain (Kuritzky & Samraj, 2012).

LBP is pain, muscle tension, or stiffness with or without referred or radicular leg pain which occurs below the costal margin and above the inferior gluteal folds (McIntosh & Hall, 2011).According to the anatomical view LBP is the pain in the lumbosacral area of the spine that encircling the distancefrom the 1st lumbar vertebra to the 1st sacral vertebra where the lordotic curve forms. The most common site of LBP is L4-L5 (Kravitz & Andrews, 1984).

The lumbar spine consists of five vertebrae. These vertebraes have heavy thick bodies to support the greater stress and weight as they serves as major load bearing portion of the vertebrae (Gunstream, 1992). Biomechanical functions of these spinesare transmitting forces (weights), bendingmoments to the pelvis, allowing motions and protecting the spinal cord (Lee, 2006).

The spine has three-joint complex at each level. This complex consists of one intervertebral disc and two facet joints (Chaurasia, 2004). Facet joints are clinically important because they are not only a direct source of pain but also stabilization structures for spine.It helps to make the spine more flexible, carry large compressive loads and these loads change with the body posture (Lee, 2006). The surfaces of the vertebral bodies are lined by thin layers of hyaline cartilage and between these layers

the intervertebral disc is a thick plate of fibrocartilage that serves as shock absorber (Chaurasia, 2004).

The ligaments of lumbar spine are anterior longitudinal ligament (ALL), posterior longitudinal ligament (PLL), interspinous ligament, intertransverse ligament and ligamentumflavum (LF). The ALL maintains the stability of the joints and limits extension. The PLL limits flexion except at the lower lumbar spinewhere it is narrow and weak. The intertransverse ligament resists lateral bending of the trunk. During flexion ligament becomes stretched and during extension it becomes contracted. As a whole ligamentpermitsufficient physiologic movements, protect the spinal cord and provide stability to the spine (Lee, 2006).

There are four functional groups of muscles- flexors, extensors, lateral flexors and rotators. These muscles govern the lumbar spine. The three function of the spine includes load-bearing, provision of movement and protection of neural elements and it protects the spinal cord and nerve roots from damage (Niosi & Oxland, 2004).Muscle provides mechanical stability during daily living activities. The spine is flexible at low loads and stiffens with increasing load. The stiffness of the spine varies with the load. During trunk flexion, extension, lateral bending and twisting the spinal stability is maintained mostly by these muscles according to the demands (Panjabi, 2003).

The spinal cord is enclosed within the spinal canal. The spinal canal works as follows: when the spine is extended it decreases in length and increased when the spine is flexed. Small nerve roots branch off from the spinal cord through spaces called neuroforamen (Lee, 2006).

Depending on the duration of pain LBP is categorized as- acute pain that lasts less than 6 weeks, sub acute pain lasts upto 6 to 12 weeks and chronic pain that lasts more than 3 months. Recurrence of LBP is common. If recurrence occur in less than 6 months is considered as exacerbation of chronic LBP. There is sometimes a very shorthyper acuteperiod that lasts for 24–48 hours. During this period there is pain and intense spasm in which sufferers are immobilized and motion is prevented. Fortunately very few patients experiences this period and usually resolves within 24–48 hours (Kuritzky & Samraj, 2012). The lifetime prevalence of acute LBP

between60% to 90% and 30% may develop a chronic condition (Ladeira, 2011). CLBP has a major impact on functional status. In addition with significant socio-economic repercussions it restricts occupational activities (Khadilkar et al., 2005).

Causes of LBP is categorize as- mechanical and non mechanical depending on the nature of pain. Mechanical LBP occurs as a result an anatomical or functional abnormality rather than underlying disease (Licciardone, 2004). Mechanical causes of back pain are lumbar strain, herniated disks, spondylosis, spondylolisthesis, spinal stenosis, fractures, congenital deformity and spondylolysis. 80-90% accounts for mechanical causes whereas non mechanical causes only 1-2% (Cohen et al., 2009). Rashid et al. (2012) reveal that about two third of adult population are affected by mechanical LBP. Its annual incidence is about 15-20% and female are more affected than male (Malmivaara et al., 1995).

One of the most common causes of LBP is strain or sprain and accounts for 65%-70% (Cohen et al., 2009). Sprains and strains are soft tissue injuries. Sprains affect tendons and ligaments whereas strains concern muscles. Injury occur when these structure are stretched beyond their normal limits due to excessive flexion or extension or when excessive forces are applied to these structurescausing tiny tears in the tissue (Akbarnia et al., 2013). If the injury persists for days to weeks then it is called acute and if it lasts longer than three months it is called chronic. It usually occurs in people with 40s but it can happen at any age (William & Shiel, 2012).

Herniated disc causes nerve impingement and inflammation resulting in radicular pain.It most commonly occurs between L4-L5 and between L5-S1 vertebrae.Another cause of LBP is spondylolisthesis that defined as forward displacement of one vertebra over another vertebra. Most common site is L5- S1. Patients typically report that pain increase with activity and with back extensionbutrelieved by flexion.Spinal stenosis is the narrowing of the spinal canal. In such case pain is provoked by walking and hyperextension of the back and relieved by rest or flexion because flexion increases the volume of the spinal canal and decreases with extension (Karnath, 2003).

Bone and joint conditions also lead to low back pain. In facet joint osteoarthritis breakdown of the cartilage leads to the cause of pain (Ullrich, 2012). Patients more than 70 years and have a history of osteoporosis often occurs spinal compression fracture (Karnath, 2003). Who use corticosteroid for long-term are more susceptible to occur a compression fracture and result in LBP (Ullrich, 2012).

Non mechanical causes accounts only 1-2% and includesneoplastic disease, infection, inflammatory arthritis, tumor of the pelvis, spine and paget's disease (Cohen et al., 2009). Pain from non mechanical causes typically occurs at rest and less affected by motion. But it is typically worsen at night and not relieved by bed rest in case of cancer. Osteomyelitis, septic discitis, and paraspinal or epidural abscess are responsible for occurring acute LBP whereas fungal or tuberculous infections are responsible for CLBP. Typically at first fever and sharp focal lumbar pain are reported by patient. On percussion there is tenderness. Some visceral diseases also responsible for LBP and it accounts about 1-2% (Karnath, 2003). Besides these there are also some psychological causes to develop the LBP which include: somatoform disorder-somatisation disorder, pain disorder, malingering and these are account for 2-4% (Cohen et al., 2009).

Risk factors for LBP have not been completely elucidated (Tomita et al., 2010). After several expert group discussions risk factors are categorized as modifiable and non modifiable. Non modifiable factors include increasing age, a previous episode of LBP, history of LBP during pregnancy, socioeconomicstatus, marriage status, educationallevel etc. Modifiable risk factors further classified as lifestyle (obesity, smoking,Alcohol intake), and occupational (heavy lifting, twisting, bending, prolonged sitting, awkward posture at work, monotonous work, previous history of injury) (Vindigni et al., 2005).

As degenerative changes in the spine and disc are one of the major causes of LBP so aging is a well known risk factor of LBP (Tomita et al., 2010). Many studies have shown that the risk of low back pain increases as a patient gets older. Our bodies are made with trillions of cells and that have more than 200 types. Cell normally reproduce and replaces the old cells during youth. Advanced age affects cellular activities including metabolism, which slows down. The annulus fibrosus the outer

layer of intervertebral discmay begin to lose elasticity and flexibility. The annulus may crack or tear the nucleus pulposus, a fibrous, gel-like core that containing protein and water may diminish water content and distressthe balance of protein to water. It also alters the strength and softness of the disc (Spineuniverse, 2013).

The risk of developing LBP increases with repeated bending and lifting activities. A high bending moment is generated on the osteoligamentouslumbar spine while bending forwards andat the same time effort of lifting generates a high compressive force. This bending and compression combindlycausesposterior discs to prolapse especially if the forces are applied repetitively. If object are lifted with straight legs or if the object are lifted is bulky or far from the body lumbar flexion increases markedly. However, there may be another cause of excessive lumbar flexion, and that is muscle fatigue. The erector spine muscles protect the spine from excessive flexion. If the muscles become fatigued and are less able to generate high forces quickly then the bending moment may increase (Dolan & Adams, 1998).

A previous back injury is the single best predictorof LBP. Injuries can occur through direct trauma, overexertion or repetitive trauma. Overexertion injury is the 60% cause of producing LBP. Among these overexertion injuries 66% occupied lifting and 20% pushing or pulling. A previous history of LBP is one of risk factor for future back problemsand chronic cases correspond to a considerable burden on the health care and compensation systems (Feldman et al., 2001).

Genes may act as propensity and predisposing factors for increasing the risks of disease development.The intervertebral disc made ofabundance of proteoglycans and collagen extracellular matrix. The outer layer of the disc is a fibrous ring that fundamentallyconstituted by collagen I while the nucleus inner structure of the disc is constituted by about 50% proteoglycans, particularly aggrecan and 20% collagen II. Both outer and inner layer contain small amounts of collagen IX (Froes et al., 2005).

Several genes found in ontology which is significant not only for nerves, pain and neurotrophinsbut also for disc signaling and functional components. At the protein level in the human annulus presence of calcitonin gene-related peptide, catechol-0 methyltransferase and bradykinin receptor B1 is key findings. Significant changes

occur in theproinflammatory and chemokine genes that are identified from nerve, neurotrophin and pain ontology searches. Primarily the disc is avascular.In the tissue disc cells produce proinflammatory cytokines and chemokines.As nerves grow into the human annulus they encounter a proinflammatory cytokine which sensitize the nociceptors and aggravate pain production (Gruber et al., 2012).

Arising number of studies indicate that smoking is a foremost risk factor for LBP. Disc cells deprived of vital nutrients because of nicotine. By the help of smoking carbon monoxide (CO) enters into the blood stream and then into body tissues. CO inhibits the nutrients absorption ability of the discthat they need from the blood. As a result discimpulsively dehydrated and become degenerated.There is an increased risk of a ruptured disc because discs become more and more malnourished (About.comSmoking Cessation, 2009). These also inhibit the absorption of calcium and reduce bone mineral content. As a resultrisk of osteoporosis increases. And also causes microfractures of the trabeculae of the vertebral bodies that lead to thedegenerative changes in the spine. Another theory is that smoking influence coughing thatincreased intradiscal and intraabdominal pressure and predisposing the patients to disc herniation (Alkherayf & Agbi, 2009).

Obesity has been defined as ‘a physiological condition in which excess body fat has accumulated to an extent that can negatively affect health’ (Bruceet al., 2009). Spineis designed to carry weight and distributed weight equally. As we age the constituents of the spine change and diminished ability to function properly. Ability of absorbing shock and cushioningmovements of the disc become decrease.Overweight persons stressing and straining their vertebrae and disc even more. As the spine will have to work harder to carry the extra weight it hastens the degenerative processes.The harder they work the faster they may wear out (degenerate) (Walker, 2012).

Lack of muscle flexibility and strength has been considered as risk factors for LBP. Decrease flexibility of the hamstrings is a result of LBP (possibly due to inactivity) rather than a cause (Feldman et al., 2001).Poor posture or improper alignment of the bodymay leads to the individuals to develop LBP.Prolong flexion position commonly responsible for occurring LBP because ligaments are overstretched and loaded and

produce mechanical stress on that structure (McKenzie, 1995). Bending and twisting are also predisposes to develop LBP (Plouvier et al., 2011).

Many studies revealed that physical fitness is related with development of LBP. The term physical fitness refers to the magnitude of aerobic fitness, muscle strength, muscle endurance, flexibility and balance. Most of the studies have shown that good physical fitness has preventive effects on back injuries thus reducing the chance of LBP (Pope, 1989).

Psychological factors are known to play a strong significant role indevelopment of LBP.The relationship between LBP and depression appears toshare a neurological pathway. Serotonin and nor epinephrine moderated the response to painful physical stimuli in the brain which also affect mood (Tucer et al., 2009).

Symptoms of LBP differ from person to person depending on the underlying precise cause. Variety of symptoms include- mild to severe pain in the lower back, pain spreading into buttocks and thighs, pain radiating from the buttock to the foot, reduced range of motion, muscle weakness, sensory changes (numbness, prickling, burning or tingling) in the leg, foot or toes (Ulrich, 2012).Another symptomincludessleep interruptions and depression.Recently, some research revealed that prevalence of sleep disturbance is 58.7% due to LBP and also affects the physiological and psychological function (Alsaadi et al., 2011).

A thorough history, physical examination and imaging studies were require to arriving at a diagnosis. To recognizecause of complicated back pain (red flags) or high risk of chronic back pain (yellow flags) a stepwise diagnostic and therapeutic approach and encouragement of physical activityare the core recommendations (Chenot et al., 2008). Onset, location, quality, radiations of the pain, factors that relieve or aggravate the pain, and associated symptoms are essential components of a thorough history. In order to exclude serious disease such as metastatic cancer it is necessary to take history of fever, weight loss and morning stiffness, radicular pain (Karnath, 2003).

The physical examination includesinspection, palpation and percussion. Lumbar flexion, extension, side-bending and rotation must be determined (Quittan,

2002).Assessment of muscle bulk, strength, tone, tendon reflexes and sensory examination are the components of neurological examination. Straight-leg raise (SLR) test should be performed to identify lumbar nerve root irritation (Karnath, 2003). Gait is also observed.Besides these some special test should be done. These special tests include: X-rays, bone scans, MRI, CT scan, myelography, discography, electromyography (EMG), nerve conduction studies and evoked potential (EP) studies (Slowik, 2012).

Though LBP is benign in nature but it is the leading cause of disability (Tomita et al., 2010).Due to the complex interplay of biological, psychological and social factors in the onset and persistence LBP it is difficult to treat only by using medical intervention. Multidisciplinary treatmentapproach is effectiveand more promising for patient with LBP (Buselli et al., 2011). Management of LBP depend on treatment goals that directed towards decreasing pain and spasm, increase muscle strength and ROM, enhance early return to activity, promote acting coping strategies and eventually improve functional status and quality of life (Khadilkar et al., 2005).

The most commonlysuggested intervention for LBP is pharmacological interventions. These are not only used for the changing of natural history of the condition but also enhance the patient's ability to be more active and to sound sleep in some cases. The most commonly prescribed medications include nonsteroidal anti-inflammatory drugs (NSAIDs) and muscle relaxants (Kuritzky&Samraj, 2012). It has significant gastrointestinal and renovascular adverse effects so short-term use of these is safe and effective (Last & Hulbert, 2009).

When conservative treatment fails and the pain becomes intrusive then surgery is indicated. The principle of surgery is to remove the pain source (the disc) and restore normal loading across the disc (Krishna, 2013).

Physiotherapy plays an important role in the treatment LBP. According to WHO, physical therapy defined as "the science of treatment through: physical, therapeutic exercise, massage and electrotherapy" in 1958 (Cuesta-Vargas et al., 2012). Physical therapy includes patient education and training in a variety of stretching and strengthening exercises, manual therapies such as mobilization, manipulation and

electrotherapeutic modalities (Krishna, 2013). Physical modalities include transcutaneous electrical nerve stimulation (TENS), heat/cold, ultrasound, short wave diathermy (SWD), interferential (Moffett & McLean, 2006). One of the most important treatments for LBP is movement so advice early activity, stretching and specific core stabilizationexercisesergonomic and postural advice (Fritz et al., 2007).

To improve spine mobility and reduce pain and disability thrust manipulative and nonthrust mobilization techniques are used. These relieves muscle spasm, correct vertebral malposition, reduction of prolapsed disc and breakdown the adhesions. Also helps to reduce pain by stimulating large alpha fibre and block nocioceptic pain (Delitto et al., 2012). Maitland's mobilizations are frequently used by applying pressure through the therapist's hands to move the vertebral joints passively through a given range.Besides these spinal manipulation refers to a high-velocity, low-amplitude thrust (Moffett & McLean, 2006). Lumbar extension is also effective (Rittweger et al., 2002).

Many studies have foundthat different exercise programmesare effective in the treatment of LBP. The results show that regular back exercise reduces back pain and improves the quality of function (Harreby et al., 1997). Exercise programmes that are design to relieve pain and improve function includesstretching, strengthening, core stability exercise and endurance or low impact aerobic exercise (Moffett & McLean, 2006). Sometimes LBP is muscular in origin. In such case strengtheningexercisesplay a vital role in protecting the spine from stress (Graves et al., 1990). Another study suggesting that core stability exercise (specifically lumbar multifidi and transverse abdominus) are important for segmental stability and control of motion in the lumbar spine (Hauggaard & Persson, 2007).

Soft-tissue therapy reduces symptoms, improves physiological function through physical and mental relaxation. By releasing endorphins massage increase the pain threshold. It is more beneficial when performed combined with exercises and patient’s education (Buselli et al., 2011).

The prognosis for chronic LBP is not so good. Patient with LBP suffers for long time and cause considerable socioeconomic costs (Aure et al., 2003). CLBP is not curable

so preventive measures can reduce the suffering of LBP. The best way of preventing it is by being physically active. Exercise programs that include aerobic conditioning and strengthening exercises can help reduce the recurrence of LBP. Maintaining correct posture during sitting and standing and try to avoid high-heeled shoes is also important. Learn and maintain how to lift objects safely to protect the back that is bend from knees and hips not back. Maintain a healthy weight to avoid excess strain on the lower back. Healthy diet, eating calcium, phosphorus, and vitamin D containing diet may help to prevent osteoporosis which can lead to compression fractures and LBP. Manage the stress in the life. Quit smoking or any kind of tobacco because itincreases the risk of bone loss and sensitivity to pain (Back Pain Health Center, 2011). Using medium-firm mattress helps to improveand prevents further risk of LBP (Chou et al., 2007).

Coping with back pain is the biggest obstacle to improvement. So a regular complete exercise programme that include strengthening, stretching, low impact aerobic exercise including swimming, bicycling, walking that helps to bring oxygen(o_2) to the soft tissues, core stabilization exercises and modification of risk factors lessen the behavioral, cognitive affect and disability aspects of back pain syndromes and also improve the quality of life, productivity, and decrease employee absenteeism.

CHAPTER-III: METHODOLOGY

3.1Study Design

A hospital based unmatched (1:1) case control study design was used for identifying the risk factors of development of low back pain for the patient attended at CRP. People with LBP were selected as case and people without LBP were selected as control.

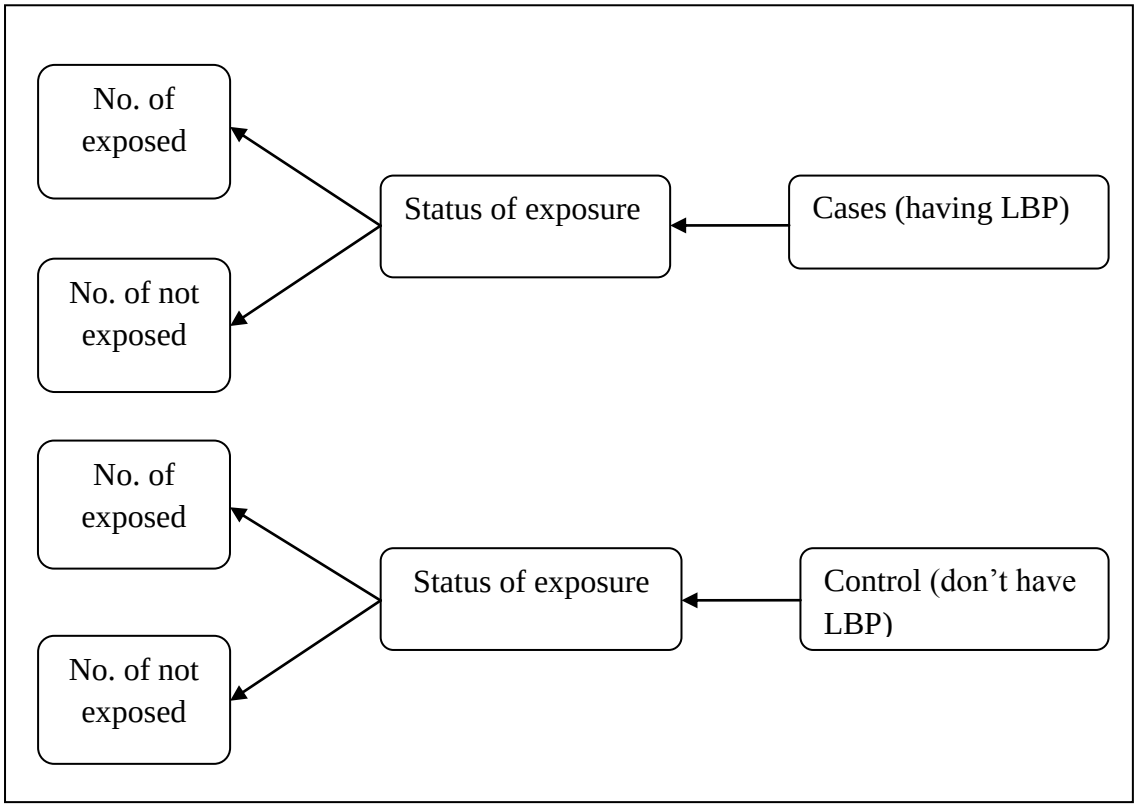


Figure-1: Design of the study

3.2 Study area

The study was conducted atMusculoskeletal Physiotherapy unit of the Centre for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka-1343, Bangladesh. Low back pain patients from all corner of the country attended CRP for comprehensive rehabilitation.

3.3 Study population

The study populations were people with LBP and without LBP who attended at CRP.

3.4 Sample size

50 cases (who have LBP) and 50 controls (who don't have LBP) were selected as sample in this study.

Formula,

$$n = \frac{2pq(Z\alpha + Z\beta)^2}{(P1 - Po)^2}$$

Where,

$$P1 = \frac{PoR}{1 + Po(R - 1)}$$

$$P = \frac{P1 + Po}{2}$$

$$q = 1 - p$$

Here, the quantities Z_α and $Z_{\boldsymbol{\beta}}$are values from the standard normal distribution.

Hypothesized minimum relative risk worth to be detected by the study, R = 3

Level of significance, α = 0.05 (Zα = 1.96, obtained from Z table)

Power of the study, $(1 - \beta)$ = 80% ($Z_{\boldsymbol{\beta}}$ = 0.84 obtained from the Z table)

Number of the calculated sample = n

P_0 = 0.84 (prevalence of LBP in literature)

According to this formula the actual sample size was about 154 but due to the limitation of time only 100samples were selected conveniently from the population for this study.

3.5 Sampling technique

There were hundred participants with or without LBP were selected through convenient sampling technique from outpatient, Musculoskeletal Physiotherapy unit of CRP. Participants were selected from CRP because they were easily accessible. Data was collected through convenient sampling technique because this technique was more feasible and less time consuming to obtain relevant information.

3.6 Subject inclusion criteria

3.6.1 Inclusion criteria for case

- Patients with low back pain who were attending in CRP for treatment as a case.
- All male and female were same priories.
- All ages were included.

3.6.2 Inclusion criteria for control

- Subjects without low back pain were considered as control.
- All male and female were same priories.
- All ages were included.

3.7 Subject exclusion criteria

3.7.1 Exclusion criteria for case

- Mentally challenged people.
- Subject who were unconscious.
- Any history of known active infection e.g. TB spine
- Female who werepregnant.

3.7.2 Exclusion criteria for control

- Mentally challenged people.
- Subject who were unconscious.
- Any history of known active infection e.g. TB spine
- Female who were pregnant.

3.8 Data collection method and tools

All patients who diagnosed as LBP by health professionals and came at CRP for first time or continuing their physiotherapy treatment were requested to participate in the study. The tools that needed for the study were- consent paper, questionnaire, paper, pen, pencil, file, weight measuring machine and calculator. There was a developed semi structured questionnaire according to pilot study findings. The study found that

almost maximum participants were female and the mean age of the participants was 41.08 (±11.91) years, most of participant's occupations were housewife. The questions were divided into seven sections which almost covered all issues regarding risk factors of low back pain. In the questionnaire participant's demographic information including age, sex, level of education, occupational history, monthly income, residential area, hobby and risk related information including-previous back injury, working posture, BMI, smoking, obesity, lifting heavy object, positive family history, regular exercise, sitting and standing posture, lumbar lordosis and sports was asked.

3.8.1 Height and weight measurement

Height was measured by using a wall scale. A standard measuring tape was fixed on the wall vertically with the 0 point placed at the floor. Height was measured with shoes removed hanging arms freely on sides. Position of the highest point of the head was noted on wall using a scale. The height of the subject was measured in meters.Weight was measured by using a standard analogue weighing machine. They were instructed to stand erect with shoes removed and emptied pockets and wear minimal clothing. Reading was taken in kilogram.

3.8.2 BMI calculation

A standard electronic calculator was used to do the calculations. BMI (body mass index) was calculated as weight in kilograms divided by height in meters squared and subjects were stratified into obese (BMI ≥ 30 kg/m2), overweight (BMI 25- 29.9 kg/m2), normal (BMI 18-24.9 kg/m2), underweight (<18) according to WHO.

3.9 Data analysis

Quantitative data was analyzed using SPSS. Data was analyzed in the form descriptive statistics for demographic data. As this was a case-control study for finding the risk factors OR was calculated as a mode of association between disease and exposure. OR was computed to determine how much risk there was in presence of certain exposure compared to those who did not have that exposure.

Exposure	Low Back Pain	
	Yes (Case)	No (Control)
Yes	a	b
No	c	d
Odds of exposure = ad / bc		

Table-1: Measurement of Odds ratio

95% CI was used to identify significance of the OR.CI having 1 between its ranges was considered to be a non significant risk factor.

3.10 Inform Consent

Written consent (appendix) was given to all participants prior to completion of the questionnaire. A written consentwas takenfrom every participants including signature. By the consent form the participants were informed that they were completely free to decline answering any question during data collection and also free to withdraw their agreement and participation any time from this study. The participants were informed clearly that the confidentiality should be maintained strictly and information might be published in any presentations or writing but they will not be identified.The participant was informed or given notice that the research result would not be harmful for them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might get benefit from it. Information from this study was anonymously coded to ensure confidentiality and was not personally identified in any publication containing the result of this study.

3.11 Ethical considerations

It wasensured that it would maintain the ethical issue at all aspects of the study because it is the crucial part of the all form of research. A research proposal was submitted to local ethical review committee of Bangladesh Health Professions Institute (BHPI) for being approval. At first official permission was to be applied for the study to the head of the Physiotherapy Department of CRP. Then the head of the Physiotherapy Department of CRP permitted to collect data at musculoskeletal department of CRP, Savar. The ethical consideration was making sure by an informed

consent letter to the participant. During the course of the study,a consent form was given to the interested participant and consent was obtained from each participant with a clear description of the study purpose. They were also informed that their participation was fully voluntary and they had the right to withdraw or discontinue from this study at any time without any hesitation or risk.Participants were also informed that confidentiality would be maintained and client codes were used to keep clients identity invisible. They were assured that taking part in this study would not cause any harm to them but the result of the study would be beneficial for them.

3.12 Limitations

In any study it is impossible to be extremely accurate. The small sample size was the prime barrier of the study. As it was a hospital based study, these were not reflecting the whole population and play an obstacle to generalizethe result for wider population and not find the real picture of LBP properly. Time of the study was very short which had a great deal of impact on the study and affect the result of the study to generalize for wider population. In this study OR was calculated as a mood of association between disease and exposure which is the indirect measure of risk. Another limitation of this study was sampling error because any factor between case and control were not matched. The study measured indirect measure of risk.In this study only common risk factors of LBP were observedand did not specify all of the factors properly. So to specify all of the factors properly may find more specific association of the factors. As it was the first research so might be there were some mistakes.

CHAPTER-IV: RESULTS

All relevant information was analyzed by SPSS v.16 software. The purpose of the study is to find out therisk factor of low back painand to achieve this goal the result need to calculate and analysis in a systematic way and the result or analyzed data represent by table, bar chart and pie charts.

The individual and occupational risk factors associated with low back pain

Name of the factor	Number of Cases	Number of Control	ODD Ratio (OR)	95% CI
Previous back injury	30	4	17.25	5.37, 55.46
Poor working posture	43	20	9.21	3.46, 24.52
Smoking habit	20	8	3.5	1.36, 8.99
Obesity	20	2	16	3.49, 73.41
Positive family history	36	7	15.79	5.76, 43.35
Regular physical exercise	4	31	0.053	0.02, 0.17
Lifting heavy object	36	12	8.14	3.32, 19.94
Poor sitting posture	44	19	11.96	4.29, 33.4

Table-2: Risk factors of low back pain

Previous Back Injury and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 30 participants had pervious back injury and 20 participants had no previous back injury in the case group. On the other hand 4 participants had pervious back injury and 46 participants had no previous back injury in the control group. Calculated OR for previous back injury is 17.25 which mean there was an association between the LBP and previous back injuries. The result indicating that low back pain is 17.25 times more frequent among those who had pervious back injury. The 95% CI of OR was ranging from 5.37 to 55.46 indicating that this association was significant.

Poor Posture during Activity of Daily Living and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 43 participants did not maintain posture during ADL and 7 participants maintain posture during ADL in the case group. On the other hand 20 participants did not maintain correct posture during ADL and 30 participants maintain posture during ADL in the control group. Calculated OR for posture during ADL is 9.21 indicating that the person who do not maintain correct posture during ADL, have 9.21 times greater chance to occur LBP comparing with the person maintain correct posture during ADL. The CI was ranging from 3.46 to 24.52indicating that this association was significant.

Smoking Habit and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 20 participants had the habit of smoking and 30 participants had no habit of smoking in the case group. On the other hand 8 participants had the habit of smoking and 42 participants had no habit of smoking in the control group. Calculated OR is 3.5 which mean smokers showed a risk of having LBP 3.5 times that of non-smokers. The 95% CIwas ranging from 1.36 to 8.99 indicating that this association was significant.

Obesity and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 20 participants were obese and 30 participants were not obese in the case group. On the other hand 2 participants were obese and 48 participants were not obese in the control group. ORwas found to be 16, suggesting that LBP is 16 times more frequent among those who were obese. The CI of OR was ranging from 3.49 to 73.41 indicating that this association was significant.

Positive Family History and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 36 participants had positive family history and 14 participants had no positive family history in the case group. On the other hand 7 participants had positive family history and 43 participants had no positive family history in the control group. OR of positive family history was found to be 15.79 which indicating that LBP is 15.79 fold highly frequent among those who had positive family history compared with who had no positive family history. The CI of OR was ranging from 5.76 to 43.35indicating that this association was significant.

Regular Physical Exercise and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 4 participants were exercise regularly and 46 participants were not exercise regularly in the case group. On the other hand 31 participants were exercise regularly and 19 participants were not exercise regularly in the control group. OR of performing regular exercise was found to be 0.053 suggesting that who exercises regularly, have 18.76 times more chance of reliving the LBP comparing with the persons who don't. The CI of OR was ranging from 0.02 to 0.17.

Frequently Lifting Heavy Object during Work Time and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control, among them 36 participants were lifting heavy object frequently and 14 participants were not in the case group. On the other hand 12 participants were lifting heavy object frequently and 38 participants were not in the

control group. Odds ratio was found to be 8.14 which indicating that who were lifting heavy object showed a risk of having LBP 8.14 times comparing with the people who don't. The 95% CI of OR was ranging from 3.32 to 19.94indicating that this association was significant.

Poor Sitting Posture and Low Back Pain

From the table it is observed that the total participants of this study were 100 where 50 were case and 50 were control; among them 44 participants maintain poor posture during sitting and 6 participants maintain good posture during sitting in the case group. On the other hand 19 participants maintain poor posture during sitting and 31 participants maintain good posture during sitting in the control group. Calculated OR for maintain posture during sitting is 11.96 which means there was strong association between the maintaining posture during sitting and 11.96 times more possible chance to occur LBP due to poor posture during sitting and 95% CI was 4.29 to 33.4indicating that this association was significant.

Socio-demographic Information

	Total (%)			Case (%)			Control (%)		
Age (mean ± SD)	41.08 ±11.91			42.22±13.31			39.94±10.31		
20-30 Years	25(25%)			11(22%)			14(28%)		
31-39 Years	22(22%)			11(22%)			11(22%)		
40-49 Years	27(27%)			13(26%)			14(28%)		
50-70 Years	26(26%)			15(30%)			11(22%)		
Gender									
Male	51(51%)			23(46%)			28(56%)		
Female	49(49%)			27(54%)			22(44%)		
BMI		**M**	**F**		**M**	**F**		**M**	**F**
Under weight	5%	0	5	3(6%)	0	3	2(4%)	0	2
Normal	50%	27	23	11(22%)	4	7	39(78%)	23	16
Over weight	23%	17	6	16(32%)	12	4	7(14%)	5	2
Obese	22%	7	15	20(40%)	7	13	2(4%)	0	2
Marital Status									
Married	87 (87%)			46 (92%)			41 (82%)		
Unmarried	12 (12%)			3 (6%)			9 (18%)		
Widow	1(1%)			1 (2%)			0		
Monthly Income									
Low (≤ 10,000 tk)	36 (36%)			29(58%)			7(14%)		
Middle (10,001-30,000 tk)	57 (57%)			19(38%)			38(76%)		
High (≥30,000 tk)	7 (7%)			2(4%)			5(10%)		
Residential Area									
Urban	49 (49%)			12 (24%)			37 (74%)		
Rural	51 (51%)			38 (76%)			13 (26%)		

	Total (%)	Case (%)	Control (%)
Educational Status			
Never attended school	12 (12%)	8 (16%)	4 (8%)
Some primary education	7 (7%)	6 (12%)	1 (2%)
Completed primary education	9 (9%)	5 (10%)	4 (8%)
Some secondary education	14 (14%)	11 (22%)	3 (6%)
Completed secondary education	12(12%)	7 (14%)	5(10%)
Higher secondary	12 (12%)	6 (12%)	6 (12%)
Bachelor or above	32 (32%)	5 (10%)	27 (54%)
Diploma	2 (2%)	2 (4%)	0
Occupation			
Service holder	29 (29%)	8 (16%)	21 (42%)
Farmer	8 (8%)	5 (10%)	3 (6%)
Driver	2 (2%)	1 (2%)	1 (2%)
Businessman	8 (8%)	2 (4%)	6 (12%)
Day laborer	1(1%)	1 (2%)	0
Housewife	36 (36%)	23 (46%)	13 (26%)
Teacher	4 (4%)	1 (2%)	3 (6%)
Student	5 (5%)	3 (6%)	2 (4%)
Garments worker	2 (2%)	2(4%)	0
Engineer	1 (1%)	1 (2%)	0
Carpenter	1 (1%)	1 (2%)	0
Retired	2 (2%)	1 (2%)	1 (2%)
Contractor	1 (1%)	1 (2%)	0

Table-3: Characteristic of the Respondents

Age of the participants

A total100 participants with Low Back Pain (50 case) and without low back pain (50 control) was interviewed for this study. Out of the participant the mean age of the participants was 41.08 (±11.91) years and minimum age was 20 years and maximum age was 70 years.

Among case the mean age of the participants was 42.22 (±13.31) years and according to data view the frequency of LBP was highest in between the 50-70 year that is 30% (n=15). 22% (n=11) case and 28% (n=14) control were between 20-30 years, 22% (n=11) case and 22% (n=11) control were between 31-39 years, 26% (n=13) case and 28% (n=14) control were 40-49 years, 30% (n=15) case and 22% (n=11) control were between 50-70 years. Beside this the mean age of the unaffected group was 39.94 (±10.31). So it can be said that age has a positive relation with the development of LBP.

Age range	Case (%)	Control (%)	Total (%)
20-30 years	11(22%)	14 (28%)	25 (25%)
31-39 years	11(22%)	11 (22%)	22 (22%)
40-49 years	13 (26%)	14 (28%)	27 (27%)
50-70 years	15(30%)	11 (22%)	26 (26%)
Total	**50 (100%)**	**50 (100%)**	**100 (100%)**

Table-4: Age range among case and control

Cross tabulation between age and low back pain

A total 69 (69%) participants were below or up to 45 years whereas 31 (31%) were above 45 years.33% (n=33) case and 36% (n=36) control were below or up to 45 years. On the other hand 17% (n=17) case and 14% (n=14) control were above 45 years.

Age of the participants	**Low back pain of the participants**		**Total(%)**
	Yes (%)	No (%)	
≤ 45 years	33 (33%)	36 (36%)	69 (69%)
> 45 years	17 (17%)	14 (14%)	31 (31%)
Total	**50 (50%)**	**50 (50%)**	**100 (100%)**

Table-5: Cross tabulation between age and low back pain

Gender of the participants

The pie chart shows that 100 subjects were used for this survey. Among them male was 51% and female was 49%.

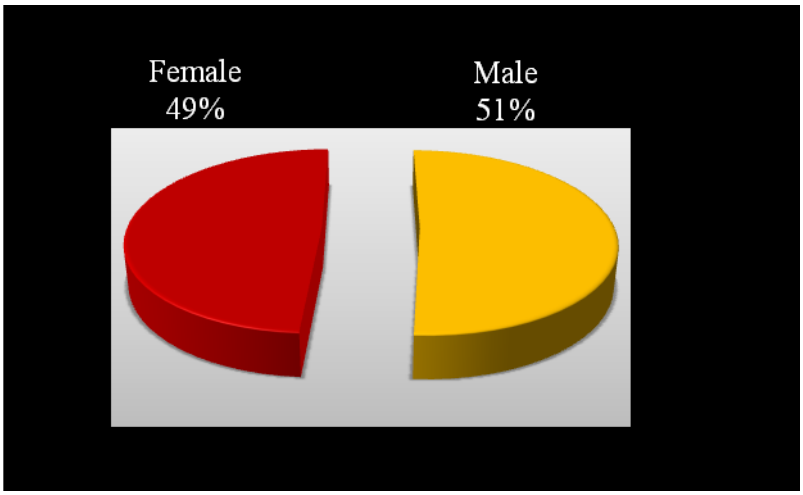


Figure-2: Gender of the participants

A total of 100 participants 23(46%) of the cases were male and 27 (54%) were female whereas 28 (56%) of the controls were male and 22 (44%) were female.

Gender	Case (%)	Control (%)	Total (%)
Male	23 (46%)	28 (56%)	51 (51%)
Female	27 (54%)	22 (44%)	49 (49%)
Total	**50 (100%)**	**50 (100%)**	**100 (100%)**

Table-6: Male and Female Ratio among Case and Control Groups

Occupation of the participants

Result showed that among 50 cases who had low back pain most of the participants were housewife that is 46% (n=23), 16% (n=8) were service holder, 10% (n=5) were farmer, 6% (n=3) were student, businessman and garments worker were 4% (n=2) respectively, teacher, driver, retired, day laborer, carpenter, contractor were 2% (n=1) respectively.

On the other hand 26% (n=13) were housewife, 42% (n=21) were service holder, 12% (n=6) were businessman, farmer and teacher were 6% (n=3) respectively, students were 4% (n=2), driver and retired were 2% (n=1) respectively among control group.

Occupation	Total(%)	Case(%)	Control(%)
Housewife	36 (36%)	23(46%)	13 (26%)
Service holder	29 (29%)	8 (16%)	21 (42%)
Farmer	8 (8%)	5 (10%)	3(6%)
Businessman	8 (8%)	2 (4%)	6 (12%)
Student	5 (5%)	3 (6%)	2(4%)
Teacher	4 (4%)	1 (2%)	3(6%)
Driver	2 (2%)	1(2%)	1(2%)
Garments worker	2 (2%)	2(4%)	0
Retired	2 (2%)	1(2%)	1(2%)
Day laborer	1 (1%)	1(2%)	0
Engineer	1 (1%)	1(2%)	0
Carpenter	1 (1%)	1(2%)	0
Contractor	1 (1%)	1(2%)	0
Total	**100 (100%)**	**50 (100%)**	**50 (100%)**

Table-7: Occupation among the Case and Control Groups

Educational status of the participants

Among 50 cases and 50 control there were respectively 16% case and 8% control never attended school, 12%case and 2% control had some primary education, 10% case and 8% control completed primary education, 22% case and 6% control had some secondary education, 14% case and 10% control completed secondary education, 12% case and 12% had higher secondary education, 10% case and 54% control had bachelor or above and lastly 4% case have diploma education.So according to result it was concluded that LBP was more frequent among those with low educational qualification.

Educational Status	Total (%)	Case (%)	Control (%)
Never attended school	12 (12%)	8 (16%)	4 (8%)
Some primary education	7 (7%)	6 (12%)	1 (2%)
Completed primary education	9 (9%)	5 (10%)	4 (8%)
Some secondary education	14 (14%)	11 (22%)	3 (6%)
Completed secondary education	12(12%)	7 (14%)	5 (10%)
Higher secondary education	12 (12%)	6 (12%)	6 (12%)
Bachelor or above	32 (32%)	5 (10%)	27 (54%)
Diploma education	2 (2%)	2 (4%)	0 (0)
Total	**100 (100%)**	**50 (100%)**	**50 (100%)**

Table-8: Educational Status among the Case and Control Groups

Residential area of the participants

In this study about 49% (n=49) people were lived in urban area and about 51% (n=51) people were from rural areas. Whereas 24% (n=12) cases and 74 % (n=37) control were lived in urban area and 76% (n=38) case and 26% (n=13) control were from rural area.

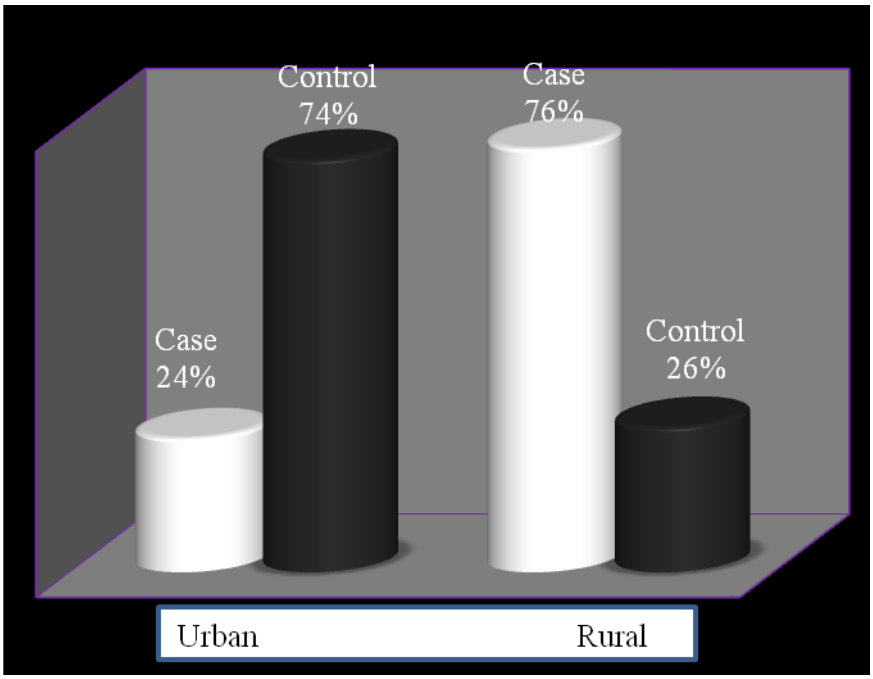


Figure-3: Residential Area among the Case and Control Groups

Body mass index

In this study 6% (n=3), 22% (n=11), 32% (n=16) and 40% (n=20) cases and 4% (n=2), 78% (n=39), 14% (n=7) and 4% (n=2) controls were respectively under weight, normal, over weight and obese. Among 100 participants 5%, 23%, 6% and 15% female were respectively underweight, normal, overweight and obese. Whereas 24% (n=12) and 14% (n=7) male were respectively overweight and obese and 8% (n=4) and 26% (n=13) female were respectively overweight and obese.

Body Mass Index	Total (%)	Case (%)	Control (%)
Under weight	5 (5%)	3 (6%)	2 (4%)
Normal	50 (50%)	11 (22%)	39 (78%)
Over weight	23 (23%)	16 (32%)	7 (14%)
Obesity	22 (22%)	20 (40%)	2 (4%)
Total	**100 (100%)**	**50 (100%)**	**50 (100%)**

Table-9: Body mass index among the Case and Control Groups

Posture during activity

Among the case that means who were suffering from LBP, 58% (n=29) participants maintained sitting posture, 28% (n=14) maintained bending posture, 8% (n=4) maintained standing posture and 6% (n=3) participants walking most of the time during work time or activity. On the other hand 52% (n=26) maintained sitting posture, 20% (n=10) maintained bending posture, 10% (n=5) maintained standing posture and 18% (n=9) participants walking most of the time during activity among control group. So the study found that the participants who maintained the long time sitting posture had the highest frequency of LBP followed by bending, standing and walking position.

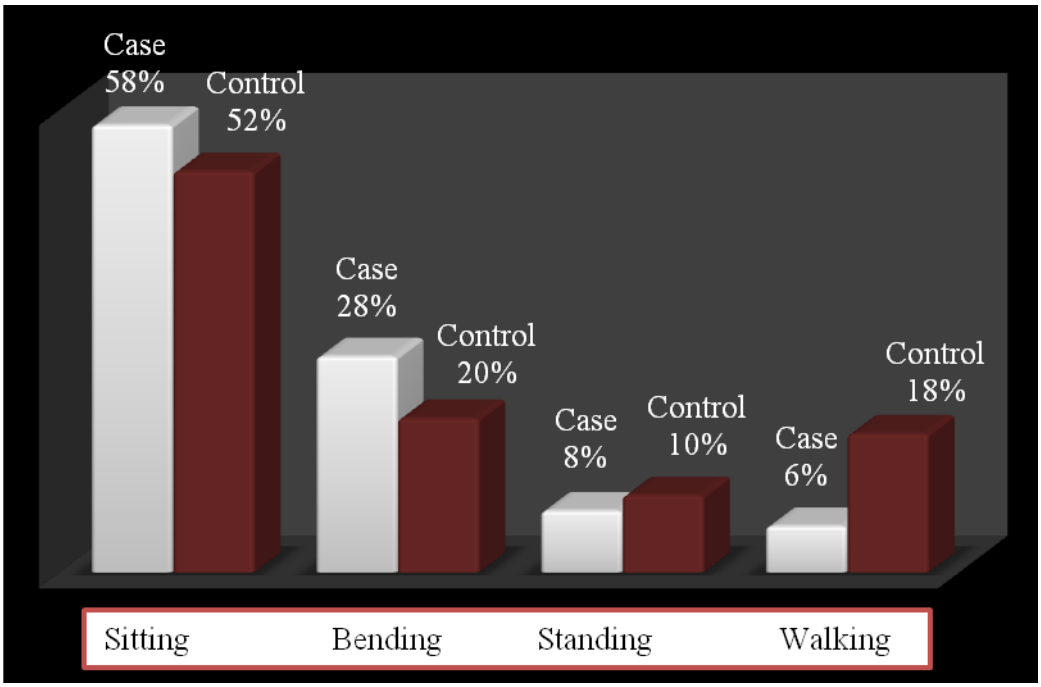


Figure-4: Posture during activity among the Case and Control Groups

CHAPTER-V: DISCUSSION

In this study the mean age was 41.08 (±11.91) years and among case group the mean age was 42.22 (±13.31). The approximate age group of maximum number of participants (27%) was between 40-49 years and among cases maximum number of participants (30%) was between 50-70 years. Shakoor et al. (2007) found that, out of 102 CLBP patients the mean age of the patients were 42.22(±8.07) and most of the patients (40.3%) were at the age group of 40 to 49 years which was nearly similar to this study. A community based survey reported that the frequency of LBP was more frequent in 50-59 years (Urquhart et al., 2009). Again according to a Thailand study published in 2006 the largest groupbeing 41-50 years (Charoenchai et al., 2006).

In this study it was found that the persons who were suffering from LBP there almost 23 (46%) were male from total male and about 27 (54%) were female from total female participants and the ratio of male female was 1:1.17. A prospective observational study among the102 CLBP patients found that 60(58.8%) were female and 42(41.2%) were male and the male female ratio was 1:1.43 (Shakoor et al., 2007). Biglarian et al. (2012) found that LBP was more frequent among female (37.5%) rather than male (18.3%) in an Iranian population. In Hungarian population the prevalence of LBP among female was 9% higher than male (Horvath et al., 2010). It also was proved that there is a positive relationship between gender and LBP as more women suffer LBP than men (Nia et al., 2011).

Study found that the participants who were suffering from LBP most of them were housewife that is 46% (n=23), 16% (n=8) were service holder, 10% (n=5) were farmer, 6% (n=3) were student, businessman and garments worker were 4% (n=2) respectively, teacher, driver, retired, day laborer, carpenter, contractor were 2% (n=1) respectively. A study 102 cases in Dhaka, Bangladesh found that a majority of the patients were housewives (58.8%) followed by government service holder (19.6%) and businessman (10.8%). Others were labourer (6.9%), private service (2.9%) and retired servicemen (Shakoor et al., 2007). Among the general Afyon population 64.2% housewives suffered from LBP (Tucer et al., 2009).Some studies indicate that

housekeeping work and childcare could increase the risk of LBP among women (Nagasu et al., 2007).

The study showed that the persons who suffering from LBP majority of participants had some secondary education (22%), 16% never attended school, 12%had some primary education, 10%completed primary education, 14%completed secondary education, 12% had higher secondary education, 10% had bachelor or above and lastly 4% case had diploma education. Alkherayf&Agbi (2009) suggested that individuals who had some postsecondary education in general had less chance to develop LBP. A study in Iran showed that most of the affected group completed their basic educational level that is 33.9%, 20.2% completed moderate educational level and 15% completed higher education. LBP is more likely to be reported by those with lower educational qualification because higher education may provide knowledge that influences on the lack of LBP (Biglarian et al., 2012).Study found that 76% participants lived in rural area and 24% participants lived in urban area. In Iran 32.6% of total population who were lived in rural area suffered from LBP (Biglarian et al., 2012).

According to the study the persons suffering from LBP about 6% participants were underweight, 22% were normal, 32% were overweight and 40% participants were obese and most of them were female. The OR for obesity was found to be 16 suggesting that low back pain is 16 times more frequent among those who were obese and CI of OR was ranging from 3.49 to 73.41 indicating that this association was significant. A cross sectional study conducted among 177 CLBP patients found that 63.3% participants were overweight or obese and 36.7% were underweight or normal (Salvetti et al., 2012). A community-based survey in large rural Australian Aboriginal area observed that most of the patients of LBP were obese (45%) and 26% were overweight and also found that females were affected more (Vindigni et al., 2005). In cross-sectional studies, prevalence of LBP was associated with obesity (OR 1.33, 95% CI: 1.14, 1.54) (Shiri et al., 2010). Tomita et al. (2010) reported that a BMI>30 kg/m2 had a 1.9 times higher chance to occur LBP among forest industry workers in Finland.

The findings in this study was smoking are risk factor for developing LBP and the study showed that smokers had 3.5 times greater chance to develop LBP than that of

non smoker and 95% CI was 1.36 to 8.99. A study showed thatprevalence of LBP is higher among current and ex-smokers than those who had never smoked and smokers had risk of having LBP 1.5 times higher than that of non-smokers as nicotinedecreased bone mineral density (Nagasu et al., 2007). Cross-sectional and prospective studies have shown that smokers have a 1.5–2.5-fold increased risk of LBP compared to nonsmokers (Deyo& Bass,1989). Hestbaek et al. (2006) found that who smoke >20 cig./day OR for those smoker was up to 4.

This study found a strong association between positive family history and LBP because the OR was 15.79 and 95% CI was 5.76 to 43.35indicating that this association was significant. A cohort studyfound thatpositive family history of LBP were a risk factor for LBP and the estimated OR was 3.8 (95% CI: 2.94–5.92) (Louwet al., 2007).

The findings in this study showed that previous history of trauma is one of the major risk factor for developing LBP because the odd ratio was17.25 and 95% CI was 5.37 to 55.46. Omokhodion found positive association between previous history of trauma and LBP and in Africa LBP is 4.14 times more frequent among those who had pervious history of trauma and 95% CI was 1.99–8.61(Louw et al., 2007).

According to this study sitting in awkward position significantly associated with LBP and 11.96 times more possible chance to occur LBP due to poor posture during sitting and 95% CI was 4.29 to 33.4. It has been postulated that sustained awkward seating posture (lordosed or kyphosed, overly arched, or slouched) increase intradiscal pressure. Therefore awkward sitting postures arepotential risk factors for the occurrence of LBP (Lis et al., 2007).Three population-based studies reported that flexed posture positively associated with the LBP and estimated ORwas 8.7 (2.1 and 46) (Heneweer et al., 2011).

The study showed that regular lifting heavy weight influenced the development of LBP. OR was found to be 8.14 that indicating 8.14 times greater chance to occur LBP those who were frequently lifting heavy object. Tomita et al. (2010) describe from previous study that lifting heavy load is a well known risk factor of LBP and also found OR for lifting heavy load was 3.52 & CI was 1.28-9.70.

In this study who was suffering from LBP, 58% participants maintained sitting posture, 28% maintained bending posture, 8% maintained standing posture, and 6% participants were walking most of the time during activity. Working position relating prolonged sitting was found to be significantly associated with LBP (Tiwari et al., 2003). Janwantanakul et al. (2011) found that forward bending is also responsible for development of LBP. One study explored the association between LBP and walking or standingand found that standing mare than 30 minute moderately associated with LBP (Heneweer et al., 2011).

According to this study frequency of LBP increased with who didn't maintain correct posture during ADL and the OR was 9.21 and 95% CI was 3.46 to 24.52. Vindigni et al. (2005) stated that during working hour stooping and awkward posture isone of the risk factor for LBP. One study explores that risk of LBP increase fourfold due to awkward posture.Exposure to awkward postureincreased (OR=2.29, 95% CI 1.22–4.29) for bus drivers when compared with maintenance workers increases LBP (Lis et al., 2007).

The finding in the present study was physical exercise were inversely associated with risk of LBP that isexercise reduce the risk of LBP. In this study the OR was 0.053 and 95% CI was 0.02 to 0.17.A population-based prospective study had reported that compared with inactive women and men the risk ratio of LBP was 0.87 (95% CI: 0.80, 0.95) and 0.88 (95% CI: 0.80, 0.97) respectively for women and men who exercised for 1.0–1.9 hours per week (Nilsen et al., 2011).

CHAPTER-VI: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

LBP has great impact causing severe long term physical disability and give rise to huge costs for the society. It has a great harmful effect on individual health, employment and daily activities of living.Literature showed that more than one-third of disability is caused due to LBP. The idea of this study was to identify the risk factors of LBP which might help to explore the underlying mechanism of it.In this case control study there was 50 cases and the same number of control that means case: control was 1:1 and conducted in hospital based unmatched setting.

The objective of this study to determine the risk factor of low back pain with considering the factor like socio-demographic and posture of ADL, previous history of trauma, habit of smoking, obesity, sitting posture, regular exercise, lifting heavy object, positive family history. This study suggests, in accordance with previous reports, that LBP is a common problem that increases with age. LBP was associated with female gender and daily smoking. A strong positive association was found between LBP and posture of ADL, sitting posture, health status, history of back injury, awkward posture. Obesity, family history, lack of regular exercise had found the positive association with the LBP.

The findings show the necessity of preventive measure focusing on LBP and health promotion should focus on the working environment and working posture.Individual risk factors and the professional risk factors noted in this survey were in accordance with most literature findings. In practice, the results of this study can help to estimate low back problems, promotion of healthy lifestyle, ergonomic measurement and control, good posture and execution educational programs and consider resting periods during the work shift. Daily life conditions and other factors are associated with the occurrence of low back pain. It is important to take comprehensive preventive measures to address a range of work and life conditions that can be improved to decrease the incidence of low back pain. Furthermore, educational programs may have a valuable rule in LBP prevention.

6.2 Recommendations

As it was an observational case control study, so the study results demonstrated indirect measure of risk (odd ratio). Further research should be done exploring direct measure of risk therefore cohort study will be appropriate. It was hospital based unmatched case control study and this did not cover all the area. So, further study is strongly recommended to include the person from the community or all over the Bangladesh to ensure the generalization of this study. In this study only 100 participants were selected as sample further research would need to be carried out with larger sample size.

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APPENDIX

মৌখিক অনুমতি পত্র

(অংশগ্রহনকারীকে পড়ে শোনাতে হবে)

আস্সালামু আলাইকুম/ নমস্কার, আমার নাম সুলক্ষনা শ্যামা বিশ্বাস, আমি এই গবেষণাটি বাংলাদেশ হেলথ্ প্রফেশনস ইনস্টিটিউট (বি এইচ পিআই), ঢাকা বিশ্ববিদ্যলয়ের চিকিৎসা অনুষদের অধিনে করছি যা আমার ফিজিওথেরাপী স্নাতক কোর্সেও আংশিক অধিভূক্তা যার শিরোনাম হল- " সি .আর .পি-তে আগত রোগীদের কোমড় ব্যাথার জন্য দায়ী ঝুকিপূর্ণ বিষয়সমূহ"। আমি এক্ষেত্রে কিছু ব্যক্তিগত এবং কোমর ব্যাথা সম্পর্কে আনুষঙ্গিক কিছু তথ্য জানতে চাচ্ছি। ফরমে উল্লেখিত কিছু প্রশ্নের উত্তর দেয়ার জন্য আন্তরিক অনুরোধ জানাচ্ছি যা আনুমানিক ২০-৩০ মিনিট সময় নিবে। আমি এই তথ্য সংগ্রহের জন্য শুধু মাত্র একবারই আপনার সাথে সাক্ষাৎ করব।

এই অধ্যয়নের লক্ষ্য হল "কোমড় ব্যাথার জন্য দায়ী ঝুকিপূর্ণ বিষয়সমূহ" সম্পর্কে জানা। যদি এই গবেষণা সম্পূর্নভাবে সফল হয় তবে কোমড় ব্যাথা হত্তয়ার জন্য দায়ী বিষয়সমূহ থেকে বিরত থেকে উপকৃত হবেন উভয়ই যারা কোমড় ব্যাথায় ভুগছেন অথবা ভুগছেন না। এইভাবে প্রতিরোধ মূলক ব্যবস্থা গ্রহনের মাধ্যমে সমাজের সাধারন জনগনের স্বাস্থ্য ও সুখ সমৃদ্ধিও উন্নতি সাধন হবে।

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

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

এই সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?
আমি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে যাচ্ছি?

হ্যাঁ ☐ না ☐

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

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

VERBAL CONSENT FORM

(Please read out to the participant)

Assalamualaikum/Namasker, my name is SulakshnaShyamaBiswas, I am conducting a study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled on "Risk factors of development of low back pain for the patients attended at CRP" from Bangladesh Health Professions Institute (BHPI) under medicine faculty of University of Dhaka. I would like to know about some personal and other related information about your problem. You are humbly requested to answer some questions that are mentioned in this form. This will take approximately 20-30 minutes. I need to meet you just once to collect entire information.

The aim of the study is to see the risk factors of development of low back pain. If the study can be completed successfully, the patients who are suffering from low back pain or who are at risk both will be benefitted by avoiding the factors that are responsible for developing low back pain. Thus the health and wellbeing of the community people would be improved through following prophylactic measure.

I would like to inform you that this is a purely academic study and obtained information will not be used for any other purpose. All information provided by you will be kept confidential and also the source of information will remain anonymous.

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

Do you have any questions before I start?
So may I have your consent to proceed with the interview?

YES ☐ NO ☐

Signature of the participant …….. Date……...
Signature of the researcher ……Date……..

Questionnaire

Title: Risk Factors of Development of Low Back Pain for the Patients Attended at CRP

Part-1: Patient's Identification	
1.1	Identification Number:
1.2	Date of Interview:
1.3	Name of respondents:
1.4	Address: House number /vill: P.O: P.S: Dist:
1.5	Contact number:
1.6	Place of data collection:
1.7	Consent Taken: Yes No

Part 2: Patient's Socio-demographic Information

QN	Questions and filters	Response
2.1	Age (in year)	……. Years
2.2	Sex:	1= Male. 2= Female
2.3	Body weight	……KG
2.4	Height Body mass index	…….m^2 (1 feet = .3048 meter)
2.5	What is your marital status?	1= Married 2= Unmarried 3= Divorced 4= Separated 5= Widow 6= Widower
2.6	What is your educational status?	1= Never attended school 2= Some primary education 3= Completed primary education 4= Some secondary education 5= Completed secondary education 6= Higher secondary 7= Bachelor or above 8= Other (Specify)
2.7	What is your profession (occupation)?	1= Rickshaw puller 2= Service holder 3= Farmer 4= Driver 5= Businessman 6= Day laborer 7= Housewife 8= Teacher 9= Student 10= Doctor

		11= Physiotherapist 12= Other (Specify)
2.8	What is the average monthly income of your household?	…… (Taka)
2.9	What is your favorite hobby?	1= Gardening 2= Reading 3= Writing 4= Playing 5= Watching television 6= Fishing 7= Horse riding 8= Stamp & coin collection 9= Other

Part 3: Pattern of physical activities

QN	Questions and filters	Response
3.1	Have you any trauma in the lumbar?	1= Yes 2= No
3.2	If yes, types of injury?	1= Direct trauma 2= Twisting. 3= Lifting 4= Carrying 5= Others
3.3	Have you any lumbar spine surgery?	1= Yes 2= No
3.4	What is your current job pattern?	1= Physical & mentally stressful job 2= Healthy friendly environment
3.5	Activity of daily living (ADL) of you?	1= Do not maintain posture 2= Maintain correct posture during ADL

Part 4: Behavior & life style

QN	Questions and filters	Response
4.1	Do you have Diabetes?	1= Yes 2= No
4.2	Substance abuse	1= Yes 2= No
4.3	Smoking	1= Yes 2= No
4.4	Obesity	1= Yes 2= No
4.5	Does any of your family members had low back pain?	1= Yes 2= No
4.6	Do you exercise regularly?	1= Yes 2= No
4.7	Physical fitness	1= Good 2= Fair 3= Poor

Part 5: Work Related Information

QN	Questions and filters	Response
5.1	Which posture do you work most of the time?	1= Sitting 2= Bending 3= Squatting 4= Standing 5= Walking
5.2	Lifting heavy object during work time?	1=Yes 2=No
5.3	Amount of lifting heavy objects	……kg

5.4	Do you have lumbar support in your sitting facility (chair) during work?	1= Yes 2= No

Part 6: Posture

QN	Questions and filters	Response
6.1	Sitting posture	1= Poor 2= Good
6.2	Standing posture	1= Poor 2= Good
6.3	Which posture do you prefer during sleeping?	1= Supine lying 2= Prone lying 3= Side lying
6.4	Which type of mattress you use during sleeping?	1= Firm / Normal mattress 2= Soft / Cushioned mattress 3= Wooden / Hard bed

Part 7: Biomechanical factors

QN	Questions and filters	Response
7.1	Anatomical texture of the body	1= Poor alignment of body 2= Good alignment of body
7.2	Lumbar lordosis	1= Normal 2= Accentuated 3= Reduced
7.3	Lateral shift	1= Right 2= Left 3= Nil

Part 8: Sports

QN	Questions and filters	Response
8.1	Sports	1= No playing 2= Used to play

Permission letter

To

The Head of the Department,

Department of the physiotherapy,

Center for the Rehabilitation of the paralyzed (CRP),

Savar, Dhaka-1343

30th March, 2013

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

Sir,

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

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

Yours faithfully

Sulakshna Shyama Biswas

Sulakshna Shyama Biswas

4th year B.Sc. in physiotherapy

Session: 2007-2008

BHPI, CRP, Savar, Dhaka-1343

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