PREVALENCE OF LUMBAR SPONDYLOLISTHESIS AMONG THE LOW BACK PAIN PATIENTS ATTENDING AT CRP

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

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

PREVALENCE OF LUMBAR SPONDYLOLISTHESIS AMONG THE LOW BACK PAIN PATIENTS ATTENDING AT CRP

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DECLERATION

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 from my supervisor.

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Abbreviations

ADL:	Activities of Daily Living
BHPI:	Bangladesh Heath Professions Institute
BMRC:	Bangladesh Medical Research Council
CRP:	Centre for the Rehabilitation of the Paralysed
LBP:	Low Back Pain
PLID:	Prolapse Lumbar Intervertibral Disc
SPSS:	Statistical Package for the Social Science
WHO:	World Health Organization

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Abstract

Purpose: The purpose of the study was to identify the prevalence of lumbar spondylolisthesis among the low back pain patient. *Objectives:* To identify the percentage of lumbar spondylolisthesis among the low back pain patients, to find out the male female ratio, to find out the most affected age group, to explore the influencing socio-demographic factors of the affected group. *Methodology:* The study design was cross sectional. Total 71 samples were selected by simple random sampling technique. *Results:* The overall prevalence of spodylolistheis was 10% (n=7). More than four fifth 85.7% (n=6) participants whose age range in between 39-45 years suffered from spondylolisthesis. Female showed higher incidence 57.1% (n=4) than male participants 42.9% (n=3). Occupation involving house wife 57.1% (n=4) shows higher incidence followed by office workers 14.3% (n=1) and farmer 14.3% (n=1) respectively. BMI does not influence in developing lumbar spondylolisthesis. Slightly higher than one fourth 28.6% (n=2) who have over weight rather than normal BMI 71.4% (n=5). Near about three fourth 71.4% (n=5) showed higher incidence of lumbar spondylolisthesis at L5/S1 level followed by L4/5 14.3% (n=1) and L3/4 14.3% (n=1) respectively. Grade-I showed higher frequency that is almost three fourth 71.4% (n=5) followed by Grade-II 28.6% (n=2). Posture may influence to develop lumbar spondylolisthesis. Sitting posture showed higher rate 57.1% (n=4) followed by bending 28.6% (n=2) then standing 14.3% (n=1). Slightly higher than one fourth 28.6% (n=2) patient complain radicular pain. Trauma is highly influence 57.1% (n=4) to develop lumbar spondylolisthesis. *Conclusion:* The study provided more insight information of the musculoskeletal disorders in a group of patients with lumbar spondylolisthesis. More research is needed to evaluate the condition and to reduce the sufferings of the patients.

Key words: Prevalence, Lumbar Spondylolisthesis, Low Back Pain.

CHAPTER-I INTRODUCTION

1.1 Background

Spondylolisthesis is defined as the anterior migration, or slip, of one vertebra in relation to the next caudad vertebra. Spondylolisthesis is considered to have two main etiologies, spondylolytic and degenerative (Wiltse et al, 1976). Spondylolytic spondylolisthesis is distinguished by chronic fracture of the pars interartucularis and is observed primarily during childhood. Degenerative spondylolisthesis refers to anterior slip without an associated defect or disruption in the vertebral ring (Fredrickson et al, 1984).

Spondylolisthesis is a disorder, usually in Lumbar spine, in which one vertebra gradually slips on another. Several types have been described (congenital degenerative pathologic, traumatic and spondyloltic). However, most spondylolisthesis is secondary to spondylosis, which represents a fibrous defect in the pars interarticularis or isthmus of the vertebra. A hereditary predisposition to develop this defect is usually manifested by repetitive stress to the lower part of the back. This causes a fatigue fracture at the isthmus that fails to heal, resulting in a fibrous nonunion. Most common at L5-S1, it develops in the teen years but may not become symptomatic until years later, if at all. The defect is often associated with lumbosacral anomalies such as transitional vertebrae (Lonnier & Marcier, 2000).

First described by Herbineaux in the late 18th century, lumbar spondylolisthesis remains a significant source of back pain and disability. From the public health perspective, it would be desirable and potentially cost effective to slow the clinical course or even prevent the occurrence of this costly spinal disorder. However, most of our current knowledge about the causes of spondylolisthesis stems from descriptive radiographic and clinical observations. For instance, it has been found that abnormalities of the upper sacrum, dysplasia of L5 neural arch and spina bifida can predispose to slippage of vertebra (Chen et al, 2004).

Incidence in school age children is 4% increasing to 6% by adulthood. Pars defects have been found in 7.2% of asymptomatic adults. Pars defects are twice as common in young males but high grade slips are 4 times more common in girls. Degenerative

spondylolisthesis is most common at L4-L5 and more common in women (Cole, 2003).

The incidence of degenerative spondylolisthesis is approximately 4.1 percent and it rarely occurs before the age of 50. It is four times more common in women than in men and typically occurs at the L4-L5 level (Abumi et al, 1990). However, men with spondylolisthesis more often reported higher levels of physical activity or walking daily for exercise than men without spondylolisthesis. Prevalence estimates among women range from 6% in Taiwan, 8% in Denmark, 20%–25% in the US, whereas among men estimates range from 3% in Taiwan and Denmark, 4%–8% in the US. Although the prevalence of spondylolisthesis increases with age, few studies have focused specifically on the elderly (Holton et al, 2010).

Further, characteristics that distinguish those with spondylolisthesis from those without have not been studied in detail, although some have reported a role for occupational factors. Thus, a clearer understanding of the epidemiology of spondylolisthesis is needed to inform discussions with patients and to formulate evidence-based treatment plans (Denard et al, 2010).

The clinical presentation can include back pain, radiculopathy, neural claudication, and referred sclerotomal pain. Approximately 75 percent of patients present with lower extremity symptoms and 40 percent will have neurologic findings, most commonly in the L5 distribution. On physical examination these patients will often have an increased ability to forward flex without the loss of normal lumbar lordosis (Abumi et al, 1990). Spondylolisthesis may be associated with back pain which may in turn be associated with spinal instability. However, it is not certain whether spondylolisthesis leads to secondary spinal hypermobility or whether the latter predisposes to early degenerative change and econdary spondylolisthesis (Bird et al, 1980).

Among elderly men, spondylolisthesis was associated with neurogenic symptoms and lower extremity functional limitations; however, spondylolisthesis was not associated with a higher likelihood of back pain in this population (Denard et al, 2010).

It is considered to be a classic example of spinal instability resulting from progressive degeneration of the facet joints and the intervertebral discs with aging (North American Spine Society; 2008). Over 300,000 lumbar spine fusions are performed in the United States each year and the number is steadily increasing (Rosenberg, 1975). Many of these fusions are performed to correct the perceived instability resulting from this disorder (Deyo et al, 2004). Despite the considerable amount of surgery performed for spondylolisthesis, the basic epidemiology of this condition is not well documented. Most studies have focused on the anatomic features associated with degenerative spondylolisthesis among symptomatic patients (Weinstein et al, 2007).

The presence of spondylolisthesis was assessed from L1 to S1 on the radiographs without knowledge of any baseline participant information. The magnitude of listhesis was measured by dividing the slip distance by the caudad body width and expressed as a percentage. Slip percentage was categorized according to the Meyerding Grading Scale with Grade 0: no slip, Grade I: 1-25%, Grade II: 26–50%, Grade III: 51–75%, Grade IV: 76–100% and Grade V: complete slippage. Slip percentage and Meyerding grade are reliable measures. Some researchers have expressed concern about the accuracy of slip of small magnitudes (Dupuis et al, 1985).

The managements of spondylolysthesis were depended on the physical symptoms and the severity of the vertebral slips. Grade-I and grade-II can be managed under conservative management, whether other grades were, whether other grades were needed for surgical and post operative physiotherapy management (Lee, 1983).

The study will focuses on the prevalence of spondylolysthesis among the low back pain patients those who were treated from the Center for the Rehabilitation of the Paralysed (CRP) by the qualified physiotherapists. As there was no study performed before to find out prevalence of spondylolysthesis among the low back pain patients CRP, so the researcher was tried to explore the factors which influences the prevalence of lumbar spondylolysthesis in its development. The study will be more helpful for both the patient and physiotherapist to identify the specific factors and there management with safely and appropriately.

1.2 Rationale

Lumbar spondylolisthesis is one of the major causes of activity limitation in the middle aged persons and they suffers for prolong period. Life become threatens for them. Despite of being an important condition as a cause of low back pain there is not available study on lumbar spondylolisthesis in Bangladesh and in CRP there is no dissertation on this condition till now. This study was conducted to enrich knowledge in this area and the investigator had interest to the musculoskeletal related problem especially in low back pain, so the investigator was attracted to conduct the study on lumbar spondylolisthesis.

There is a great demand in indentifying the influencing factors of lumbar spondylolisthesis to reduce the sufferings of the patients. By conducting this study it is expected that some of these factors can be identified to minimize the cost treatment, morbidity, absent from work and moreover physical and psychological distress. Identification of these factors will make people aware about the condition. It will be also helpful to reduce the incidence of lumbar spondylolisthesis and introduction of physiotherapy treatment of this condition. The identification of the prevalence and influencing factors of lumbar spondylolisthesis can help to act as preventive measure to lessen the sufferings community people as a whole.

1.3 Research Question

What is the prevalence of lumbar spondylolisthesis among the low back pain patients attending at CRP?

1.4 Study Objectives

General objective

- To identify the prevalence of lumbar spondylolisthesis among the low back pain patients.

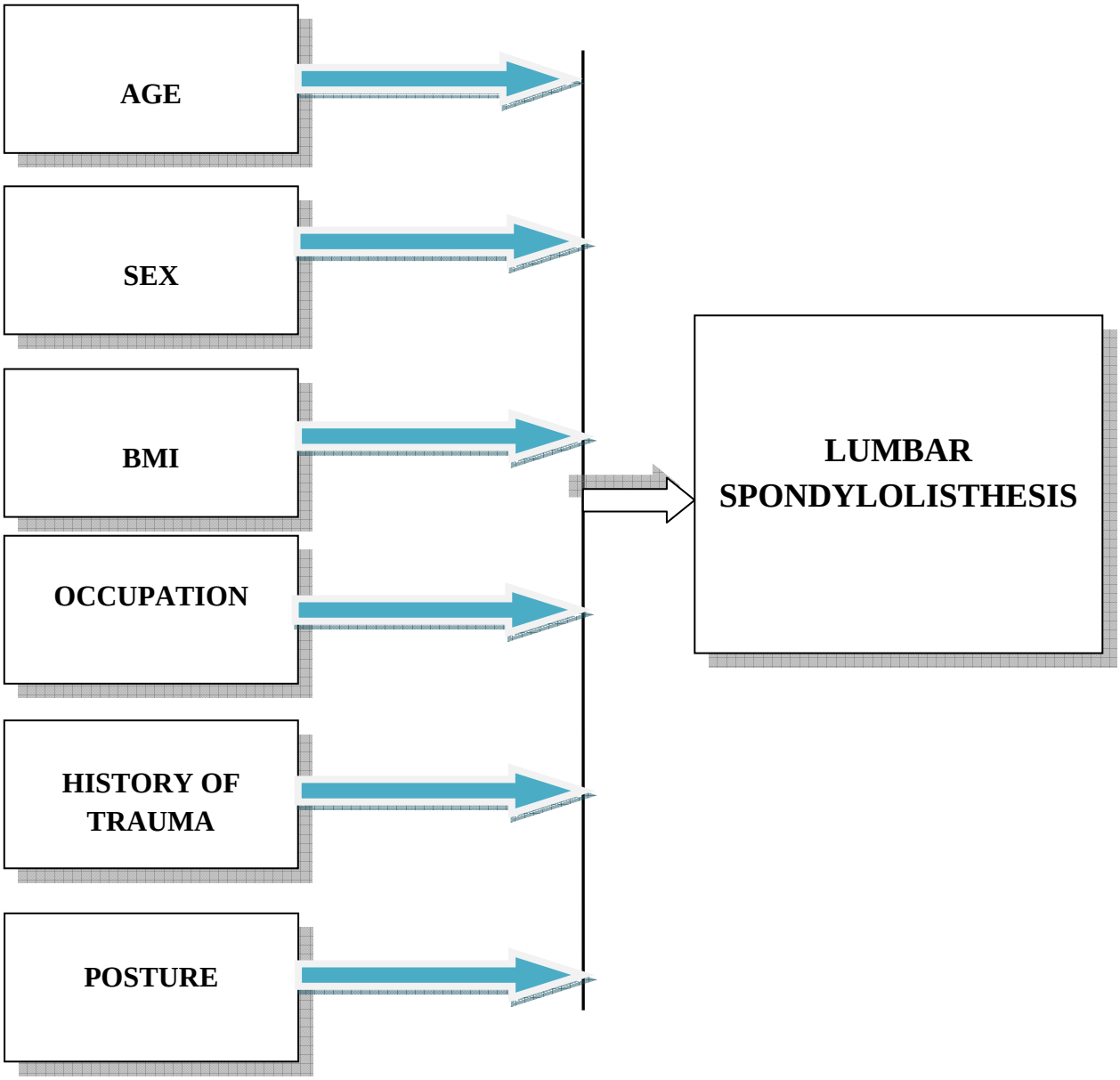
Specific objectives

- To find out the prevalence of lumbar spondylolisthesis among the low back pain patients.
- To identify the male female ratio of lumbar spondylolisthesis patients.
- To find out the most affected age group of the lumbar spondylolisthesis patients.
- To explore the influencing socio-demographic factors of the affected group.

1.5 List of Variables

Conceptual Framework

Independent variable **Dependent variable**



1.6 Operational definition

Prevalence: Prevalence specifically refers to the all current case (old & new) existing at a given point in time or over a period of time in a given population.

Spondylolisthesis: Spondylolisthesis is the forward slipping or gliding of a vertebra on the vertebral body below.

Lumbar spondylolisthesis: Lumbar spondylolisthesis is a condition in which one vertebral body becomes progressively out of alignment with another in a front-to-rear orientation.

Low back pain: Low back pain refers to pain felt in lower back. It may also have back stiffness, decreased movement of the lower back and difficulty in standing straight.

CHAPTER-I LITERATURE REVIEW

It was Newman in 1963, who coined the commonly used term degenerative spondylolisthesis to describe anterolisthesis in the setting of severe degenerative changes of the facet joints and intervertebral disc. However, degenerative spondylolisthesis was first described by Junghanns in 1930 as "pseudospondylolisthesis" and later, in 1950, by McNab as "spondylolisthesis with an intact neural arch (Abumi et al, 1990).

The term spondylolisthesis was used by Kilian in 1854 and is derived from the Greek word spondylos meaning vertebra and olisthesis meaning to slip or slide down a slippery path (Canale, 1998).

Lumbar spondylolisthesis is a condition in which one vertebral body becomes progressively out of alignment with another in a front-to-rear orientation. Typically, the problematic vertebral body is a certain degree forward of the body below it (Ekman et al, 2005).

Spondylolisthesis is the anterior or posterior displacement of a vertebra or the vertebral column in relation to the vertebrae below. The variant "listhesis", resulting from misdivision of this compound word, is sometime applied in conjunction with scoliosis. These "slips" (aka "step-offs") occur most commonly in the lumbar spine (Loubresse, 1996).

Spondylolisthesis can be a progressively acquired spinal deformity occurring in the context of severe degenerative arthritis or it can occur as a result of a (usually hidden) birth abnormality of the spine. Both forms usually develop slowly over the course of many years and a person might not have any symptoms he considers abnormal until the process has been well established (Peek et al, 1989). There are relatively common forms of spondylolisthesis which can occur along with degenerative arthritis and lumbar spinal stenosis although these conditions tend not to be as structurally unstable as other forms. Instability means abnormal sliding motion and change in the

alignment during spinal movements (Ekman et al, 2005). The bone structure slowly yields to forces producing malalignment and is remolded. Many individuals will be found to have no instability or change in alignment during spinal movement but some will be unstable. Occasionally, the upper vertebral body involved in the malalignment is displaced to the rear rather than toward the front. In the congenital form due to birth abnormality, there is malformation of the facet joints or a portion of the lamina ("pars defect") which renders the facet joints less effective in stabilizing the spine against forward and backward movements. Possibly, the natural degeneration of the intervertebral disc between those bodies eliminates the strongest bond and leads to progressive slippage. Occasionally, patients will notice sudden worsening of previously mild low back pains following physical exertion or an accident. At other times, low back pain develops slowly without notable incidents (Peek et al, 1989).

People with an abnormal forward curvature of the lumbar spine (swayback) are more at risk for developing a spondylolisthesis (Kumar, 1993). Postural deformity or gait abnormality caused by hamstring spasm, vertical sacrum, trapezoid-shaped L5 vertebra body, increasing slip angle, instability (Canale, 1998). Individuals participating in contact sports such as football or volleyball also are at higher risk, as are those who perform certain types of gymnastics. Postmenopausal women also are at greater risk because they are more likely to have osteoporosis (Kumar, 1993).

Two of the more commonly used classification systems for spondylolisthesis were proposed by Wiltse et al. and Marchetti and Bartolozzi. Wiltse et al. categorized spondylolisthesis into six types.

- Type I, or dysplastic, involves congenital dysplasia of the sacrum or L5 neural arch, with pars elongation or lysis which can develop later.
- Type II, or isthmic, is a defect in the pars interarticularis, with pars lysis (type IIA), pars elongation (type IIB), or acute pars fracture (type IIC).
- Type III, or degenerative, is a result of facet arthrosis leading to subluxation.
- Type IV, or traumatic, is secondary to acute fracture of the posterior elements other than the pars.
- Type V, or pathologic, is associated with incompetence of the posterior elements secondary to a systemic or local bony pathologic process.

- Type VI, or post-surgical, is a result of loss of posterior elements due to surgery.

  This classification system combines both anatomical and etiological factors and it is not always easy to distinguish type I (congenital dysplastic) from type II (isthmic) since the latter can also be congenital (Lamartina et al, 2009).

The most practical classification system in terms of prognosis and therapy is that of Marchetti & Bartolozzi. In this system, spondylolisthesis is divided into two major groups, developmental or acquired (Marchetti & Bartolozzi, 1997).

Developmental spondylolisthesis is further divided into two types, both with lysis and elongation: low dysplastic and high dysplastic, depending on the severity of the bony dysplastic changes present on the L5 and S1 vertebrae and on the risk of slip progression.

- The low-dysplastic type is described as having a relatively normal lumbosacral profile, a normal appearing rectangular L5 vertebra, a normal S1 superior end plate, no pelvic retroversion or hyperlordosis, and very low risk of slip progression (up to 50%).
- Conversely, highdysplastic spondylolisthesis is associated with lumbosacral kyphosis, a trapezoidal L5 vertebra, a dome-shaped superior end plate of S1, pelvic retroversion and hyperlordosis, and very high risk of slip progression (Lamartina et al, 2009).

Isthmic spondylolisthesis is the most common form of spondylolisthesis. Isthmic spondylolisthesis (also called spondylolytic spondylolisthesis) is a common condition with a reported prevalence of 5%-7% in the U.S. population. The spondylolytic defect is usually acquired between the ages of 6 and 16 years, and that the slip often occurs shortly thereafter. Once the slip has occurred, it rarely continues to progress, although one study did find an association between disc desiccation and slip progression during middle age. It is thought that the vast majority of isthmic slips do not become symptomatic, but the incidence of symptoms is unknown. Roughly 90% of isthmic slips are low-grade (less than 50% slip) and 10% are high-grade (greater than 50% slip) (Ishihara, 2001).

Patients with symptomatic low-grade (<50% slippage) isthmic spondylolisthesis typically present with activity related back pain and often with radicular symptoms as well, but despite the large number of individuals with radiographic evidence of isthmic spondylolisthesis, few of them become symptomatic or require treatment (Greenough et al, 1998).

High-grade isthmic spondylolisthesis and dysplastic spondylolisthesis are regarded as separate clinical entities from low-grade isthmic slips. High-grade slips are defined as those with greater than 50% forward displacement. These slips are also accompanied by a significant amount of lumbosacral kyphosis, which is forward bending of the L5 vertebral body over the sacral promontory. Rounding of the sacral body and trapezoidal deformation of L5 are also common features. High-grade slips are much rarer than low-grade slips, representing less than 10% of all isthmic slips, and the vast majority present during adolescence, most during the early teenage years (Chen et al, 2008).

Unlike low-grade slips, many patients present without pain. Instead symptoms like bodily deformity, neurologic abnormalities, tight hamstrings, and abnormal gait are often the reason for consultation. The natural history of high-grade spondylolisthesis is also quite different from those with low-grade slips. The majority of low-grade slips are asymptomatic and do not progress past a patient's initial presentation. Prospective studies on children with low-grade slips have demonstrated that once a slip occurs, it rarely worsens. However, high-grade slips do continue to progress in many cases and are much more likely to cause pain (Chen et al, 2008). Some cases do eventually progress to complete spondyloptosis and prevention of progression is the primary focus of surgery for high-grade slips (Inoue et al, 1984).

Degenerative spondylolisthesis is a disease of the older adult that develops as a result of facet arthritis and facet remodeling. As the facets remodel, they take on a more sagital orientation, allowing a mild slip to occur. These slips are very common in the eldely people aged 65 years. Most slips are asymptomatic but can worsen the symptoms of neurogenic claudication when associated with lumbar spinal stenosis (Kanamori et al, 2005).

Unlike isthmic spondylolisthesis, degenerative spondylolisthesis is not associated with a neural arch defect, meaning that the forward translation of the vertebral body also causes narrowing of the central spinal canal at the level of the slip. This narrowing of the canal in degenerative spondylolisthesis has been termed the "napkin ring effect", an illustrative description as one imagines the spinal canal as a series of napkin rings with one of the rings slid forward in comparison to the others (Takahashi, 1990). Degenerative spondylolisthesis may occur as a result of one or more of the following causes: degenerative changes in discs, facet joints, and ligamentous structure, disc herniation, or previous surgical intervention (Chen et al, 2008).

The classic symptomology of patients with symptomatic degenerative spondylolisthesis are similar to those with symptomatic lumbar spinal stenosis; which can be either neurogenic claudication or radiculopathy (either unilateral or bilateral radiculopathy) with or without low back pain. Neurogenic claudication is thought to result from central canal narrowing that is exacerbated by the listhesis (forward slip). The classic symptoms of neurogenic claudication are bilateral (both legs) posterior leg pain that worsens with activity, but is relieved by sitting or forward bending (Takahashi, 1990).

The most common grading system for spondylolisthesis is the Meyerding grading system for severity of slip. The system categorizes severity based upon measurements on lateral X-ray of the distance from the posterior edge of the superior vertebral body to the posterior edge of the adjacent inferior vertebral body. This distance is then reported as a percentage of the total superior vertebral body length:

- Grade I is 0–25%.
- Grade II is 25–50%.
- Grade III is 50–75%
- Grade IVis 75–100%
- Over 100% is Spondyloptosis, when the vertebra completely falls off the supporting vertebra (Kaplan, 1985).

Typical physical changes that occur in an individual with spondylolisthesis will be a general stiffening of the back and a tightening of the hamstrings, with a resulting

change in both posture and gait. The posture will typically give the appearance that the individual leans forward slightly and/or that they are suffering from kyphosis. In more advanced cases, the gait of the individual may change to give the appearance of more of a "waddle" than a walk, where the individual rotates the pelvis more due to the decreased mobility in the hamstrings. A result of the change in gait is often a noticeable atrophy in the gluteal muscles due to lack of use (Carragee, 1997).

An individual suffering from spondylolisthesis will typically experience generalized pain in the lower back, along with intermittent shocks of shooting pain beginning in the buttock traveling downward into the back of the thigh and/or lower leg. Sciatica that extends below the knee may be felt in the feet. Sometimes symptoms include tingling and numbness. Sitting and trying to stand up may be painful and difficult. Coughing and sneezing can intensify the pain. The individual may also note a "slipping sensation" when moving into an upright position. An increase in activity level, for an individual experiencing pain of this type, will likely cause the individual to experience an increase in pain levels in the day(s) following the activity due to inflammation of the soft tissues, which is alleviated with reduced activity and/or rest (Deguchi et al, 1998).

The appropriate treatment of patients with isthmic spondylolisthesis is just as controversial as the cause of symptoms. Patients with isthmic spondylolisthesis are usually divided into two general classes for both treatment and for study: low grade isthmic spondylolisthesis (<50% slip) and high grade isthmic spondylolisthesis (>50% slip). Patients with low grade spondylolisthesis are usually young adults (90% adults and 10% adolescents) who present with low back pain and often with radiculopathy. High grade spondylolisthesis may also present with back pain, but may also present with cosmetic deformity, hamstring tightness, radiculopathy, abnormal gait, or it may be asymptomatic (Moller & Hedlund, 2000).

Patients with symptomatic isthmic spondylolisthesis are initially offered conservative treatment consisting of activity modification, chiropractic treatment, pharmacological intervention, and a physical therapy consultation. Anti-inflammatory medications (NSAIDS) in combination with acetaminophen (Tylenol) can be tried initially. If severe radicular component is present, a short course of oral steroids such as Prednisone or Methylprednisolone can be considered. Chiropractic treatments and

physical therapy can evaluate and address postural and compensatory movement abnormalities such as hyperlordosis and hip flexor and lumbar paraspinal tightness. The majority of these patients also present with chronically tight hamstrings. Physical modalities such as thermal treatment, electrical stimulation and lumbar traction can help with reactive muscle spasm, but typically are of short therapeutic duration when done in isolation, and should be coupled with therapeutic exercise. Epidural steroid injections, either interlaminar or transforaminal, performed under fluoroscopic guidance can help with severe radicular (leg) pain. Lumbosacral orthoses may be of benefit for some patients but should be used on a temporary basis to prevent spinal muscle atrophy and loss of proprioception (Dennis, 1989).

The aim of surgical treatment of degenerative spondylolisthesis should be to provide an early relief of symptoms and long-term effectiveness. If conservative treatment is ineffective, the most common surgical procedure is spinal fusion combined with decompression of the neural elements. Recent surgical trends for this pathology are spinal fusion and decompres-sion of the spinal segment by means of the instrumentation technique (Motosuneya, 2005). In cases of a bilateral radiculopathy in a dermatomal distribution that matches the patient's segment with spondylolisthesis, as well as radiologic evidence of slip (listhesis) progression, the differential diagnosis is narrower and the diagnostic accuracy higher (Kumar, 1993).

The addition of decompression does not appear to improve clinical outcome in addition to fusion for the treatment of low-grade isthmic spondylolisthesis in patients without serious neurological deficit (Phillips, 2000). There are several forms of surgery that have been advocated for the treatment of high-grade isthmic spondylolisthesis, including posterior interlaminar fusion, in situ posterolateral fusion, in situ anterior fusion (ALIF), in situ circumferential fusion, instrumented posterolateral fusion, and surgical reduction with instrumented posterior lumbar interbody fusion (PLIF). Advocates of these different techniques all cite specific advantages of each approach, but they all have established risks and some are much more complication-prone than others (Seitsalo, 1997).

In addition to the ongoing debate of reduction versus fusion in situ, there is also new evidence emerging as to what form of fusion is most effect for eliminating symptoms and controlling deformity. This discussion of surgical technique has been much

enhanced recently by the publication of a long-term follow-up study comparing three different techniques of fusion in situ for treating high-grade spondylolisthesis. Anterior fusion is a relatively new technique to spine surgery, emerging during the last two decades. It involves either a retroperitoneal or transperitoneal (through the abdomen) approach to the lumbosacral junction with mobilization of the iliac arteries and veins (Chen et al, 2008). The surgeon then performs a total discectomy and places a bone graft into the intervertebral space; the graft is usually either a tricortical iliac crest or a femoral ring allograft. For circumferential fusion, after completing the anterior fusion, the patient is turned and a one or two level posterolateral fusion without instrumentation is performed. Circumferential fusion can either be performed under one run of general anesthesia with patient repositioning or the procedure can be staged (Moller & Hedlund, 2000).

Advocates of surgical reduction state that fusion in situ leaves too much residual deformity and impairs the natural mechanics of the lumbar spine. Patients with high-grade isthmic tend to have hyper-lordosis of the lumbar spine that compensates for the lumbosacral kyphosis associated with the severe slip and many feel that this hyper-lordosis will lead to early arthritis and low back pain (Christensen, 1996).

Physiotherapy Management for lumbar spondylolisthesis are described below

1. Some modalities like SWD are given for pain relief.
2. Exercise to correct the deformities

- Exercises to induce relaxation are given
- Strong abdominal exercises are given for abdominal muscles
- Flexion exercises for the spine, for example: sitting on a chair with back resting, then gradually bending the trunk forward from the lumbar region
- Active posterior tilting is taught to the patient to compensate the exaggerated lumbar lordosis.

3. The patients are given guidelines for correction of posture.
4. Stretching of hamstring is done at regular intervals.
5. The patient is advised to lie prone to control the advancement of lumbar lordosis.

6. A thoraco-lumbo-sacral brace is given to prevent the lordosis. The brace has to be worn continuously.

Physiotherapy after surgery are following

1. Deep breathing exercise.
2. Early foot, ankle and arm movements are also encouraged.
3. Assisted active movements to knee joints are given.
4. Isometric exercise for gluteal muscles.
5. Gradual hip flexion is encouraged but it should not be exceed 60 degrees (Kaplan, 1985).
6. During mobilization-

- Gradual mobilization of spine is initiated.
- The patient is encouraged to perform functional activities and gradually to perform all the ADLs (Lee, 1983).

CHAPTER-III METHODOLOGY

The major aim of the study was to answer the question of “Prevalence of lumbar spondylolisthesis among the low back pain patients attending at CRP.” This research setting in which the study was carried out including research methods used in the study, study design, study population, sampling method, instrumentation and data collection etc.

3.1 Study design

The study was conducted by a cross sectional research model to find out the prevalence of lumbar spondylolisthesis among the low back pain patient because the cross sectional study is the best way to determine prevalence. The cross sectional study also can be used to identify the associations. The most important advantage of cross sectional study is it need not more times and also cheap. As there is no follow up, fewer resources are required to run the study. A cross-sectional study is a descriptive study which providing a "snapshot" of the frequency and characteristics of a disease in a population at a particular point in time.

This cross sectional survey study carried out among patients who were suffering from low back pain in Centre for the Rehabilitation of the Paralysed (CRP) at Musculoskeletal unit. This study was conducted to find out the prevalence of spondylolisthesis among the low back pain patients.

3.2 Study site

The site of study was musculoskeletal unit of CRP, Savar as a venue so that an appropriate sample included easily.

3.3 Study area

Musculoskeletal conditions of the patient attending at CRP physiotherapy musculoskeletal unit.

3.4 Study period

All the data was collected by asking questions using a standard questionnaire from participants. There was taken time for data collection about from April to July 2012.

3.5 Study population and sample population

All patients with low back pain in Bangladesh were selected as the target population. In this study, the sample populations were those low back pain patients who came to CRP to receive physiotherapy treatment.

3.6 Sampling technique and sample size

The method of simple random sampling procedure in order to recruit the study's participants was used in the study.

Participants will be selected from the population who met the inclusion and exclusion criteria and within the scarcity of time.

The actual sample size for this study was calculated as 113, using the calculation of Formula:

$$n = \left\{\frac{Z(1-\frac{\alpha}{2})}{d}\right\}^2 \times pq$$

Here,

$Z(1-\frac{\alpha}{2})$= 1.96

P= 0.08

q= 1-p

= 1-0.08

= 0.92

d= 0.05

But as the study was done as a part of fourth professional academic research project and there were some limitations so the researcher had to limit with 71 people as sample.

3.7 Inclusion criteria

- Patient who agree willingly participate in the study as maintaining ethical rules.
- Patients with low back pain who were attending in CRP for treatment.
- Age range 18 to 65 years as mechanical LBP patient's most commonly found in this age range.
- All male and female were same priories.

Male and female had different anatomical, physiological changes as well as different intensity, frequency and pattern of activity. Inclusion of males and females may be more comprehensive in identifying the prevalence.

3.8 Exclusion criteria

- Patient who were unconscious, cognitive problem as they won't cooperate with investigator.
- Any severe fracture or existing red flags of spinal pain or interference from a concerned orthopedic consultant.

These types of patients were unable to provide accurate information and continue the study.

3.9 Data collection tools

Data was collected through the face to face interview with participants and the researcher. Data was analyzed Microsoft office Excel 2007 using a SPSS 16 version software program. The tools that needed for the study were- Consent paper, questionnaire, the reports of lumbar spine X-rays (A/P and lateral view radiographs), paper, pen, file, calculator, computer, and printer.

A structured questionnaire paper set, validated by a jury of experts involved in the management of LBP (by Clinical Physiotherapists). The questions were divided into four sections and sought information on identification of socio-demography, job pattern, nature of pain and trauma related information.

3.10 Data management and analysis plan

The data that collected were descriptive data. In the study there used the graph technique for analyzing data, calculated as percentages, and presented this using bar and pie charts by SPSS (Statistical Package of Social Science) software version 16.0.

3.11 Informed consent

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

3.12 Rigor

During the period of data collection and analysis, investigator always tried not to influence the process by his own perspectives, values and biases. When conducting the study the investigator took help form the supervisors and physiotherapists.

3.13 Ethical consideration

The proposal of the study is approved by the ethical committee of the member of faculty of Physiotherapy Department. The study had done by following the guideline given by local ethical review committee and also followed WHO & BMRC guidelines. Strictly maintained the confidentiality and informed consent would be taken.

3.14 Limitation of the study

This was a small study which needs to be replicated with larger numbers of participants.

Regarding this study, there were some limitations or barriers to consider the result of the study as below:

- In the study, data were collected only from CRP, Savar, Dhaka. If investigator got a larger data, it may make the result more valid and reliable.
- For receiving physiotherapy treatment, only few lumbar spondylolisthesis patients came to the physiotherapy department at CRP. Most of the patients were not represented all over populated of Bangladesh, so most of the lumbar spondylolisthesis patients did not participate in this study.
- As the study was conducted at Centre for the Rehabilitation of the Paralysed (CRP) which may not represent the whole country.

CHAPTER-IV RESULTS

Data were analyzed by descriptive statistics and calculated as percentages and presented by using bar graphs, pie charts.

Prevalence of lumbar spondylolisthesis

After analysis this study it was found that 9.9% (n=7) had suffered from lumbar spondylolisthesis out of the 71 participants (Figure-1).

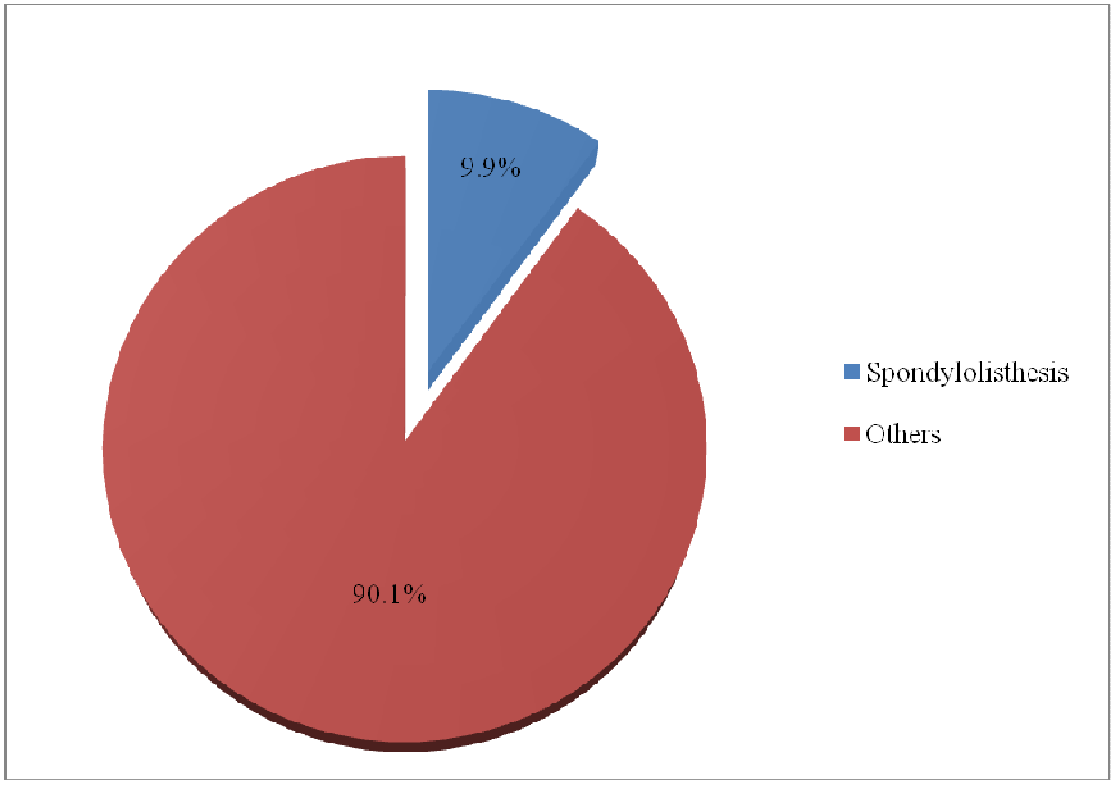


Figure -1: Prevalence of lumbar spondylolisthesis.

Age

Outcome revealed that 85.7% (n=6) participants in between 39-45 years and 14.3% (n=1) participant more than 45 years had suffered lumbar spondylolisthesis out of 7 participants (Figure-2).

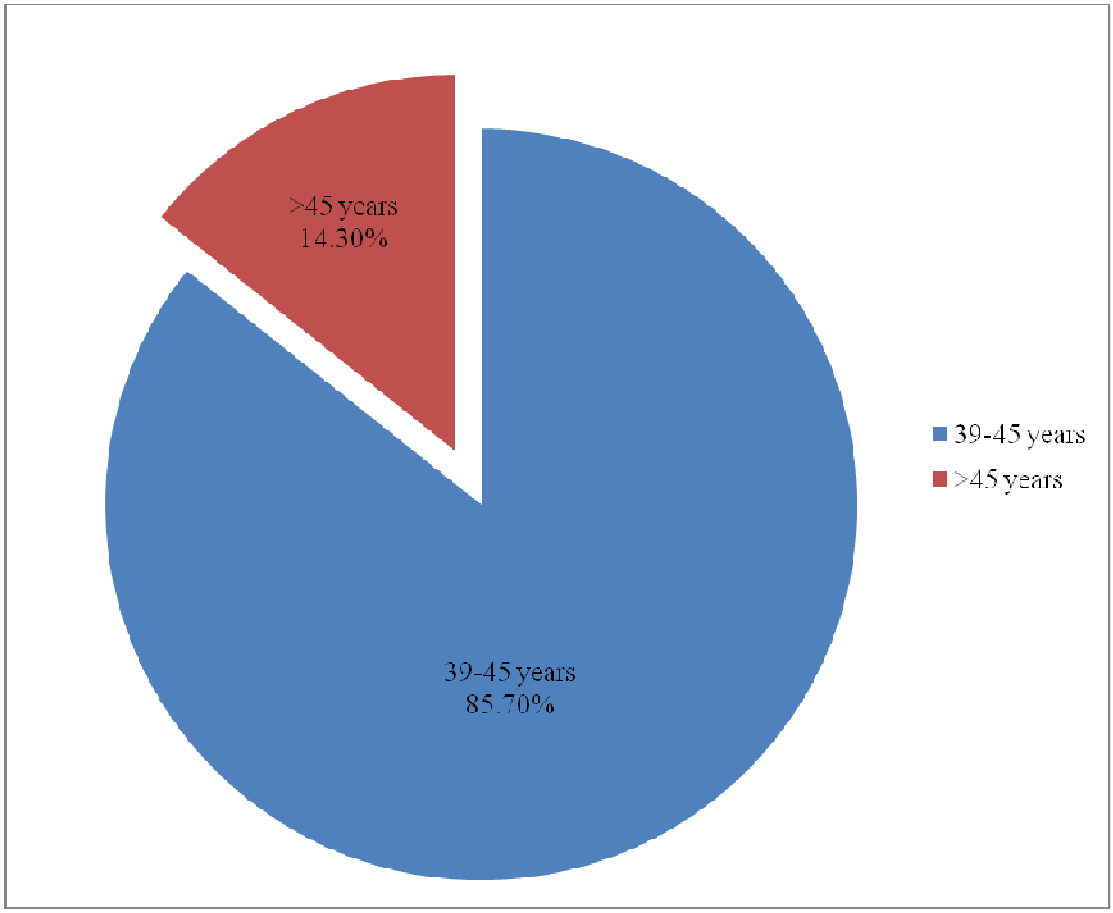


Figure-2: Age of the participants.

Male and female

Analysis demonstrated that among the 7 participants who had lumbar spondylolisthesis 57.1% (n=4) were female and 42.9% (n=3) were male (Figure-3).

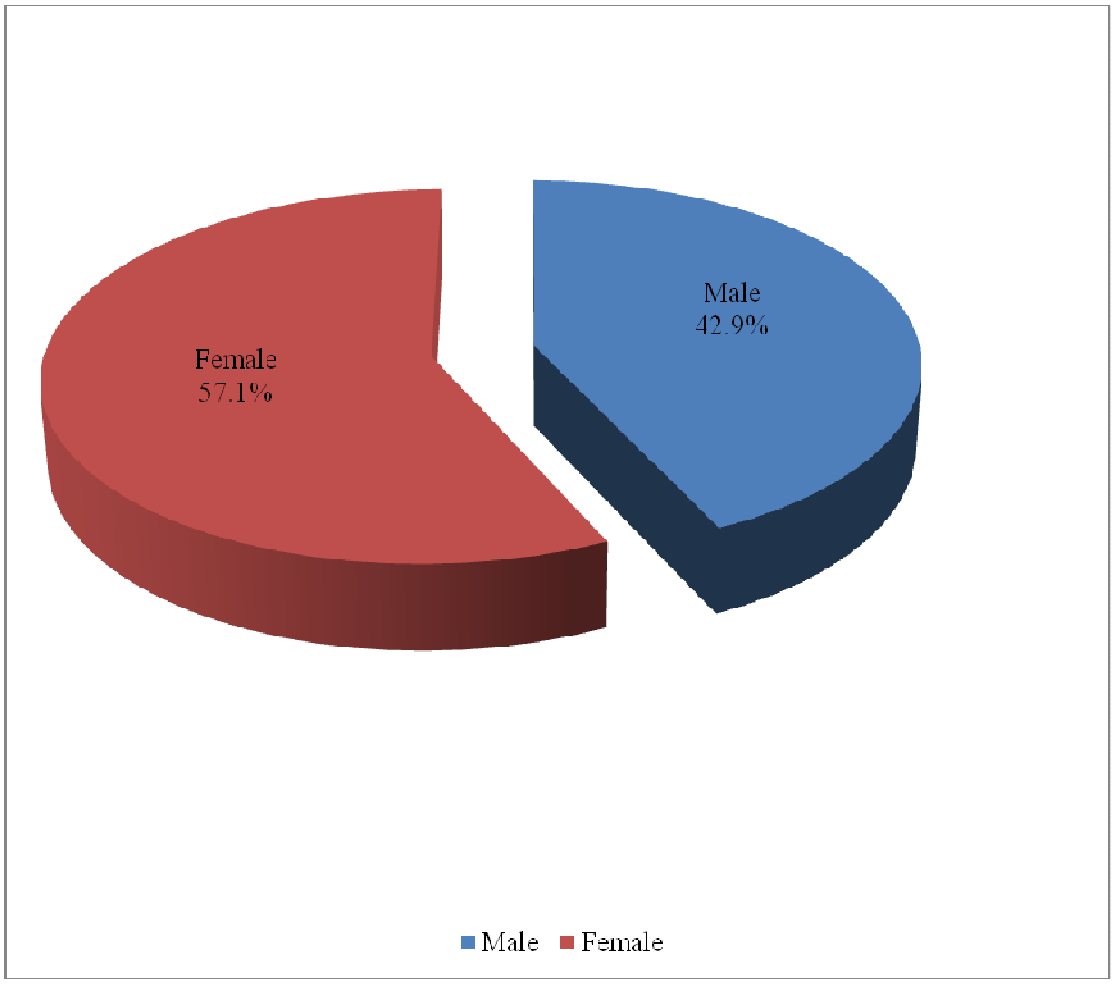


Figure-3: Male and female participants.

Educational status

Analysis showed that among the 7 participants with spondylolisthesis 28.6% (n=2) were illiterate, 42.9% (n=3) were completed primary level, 14.3% (n=1) was completed SSC level and 14.3% (n=1) was completed masters (Figure-4).

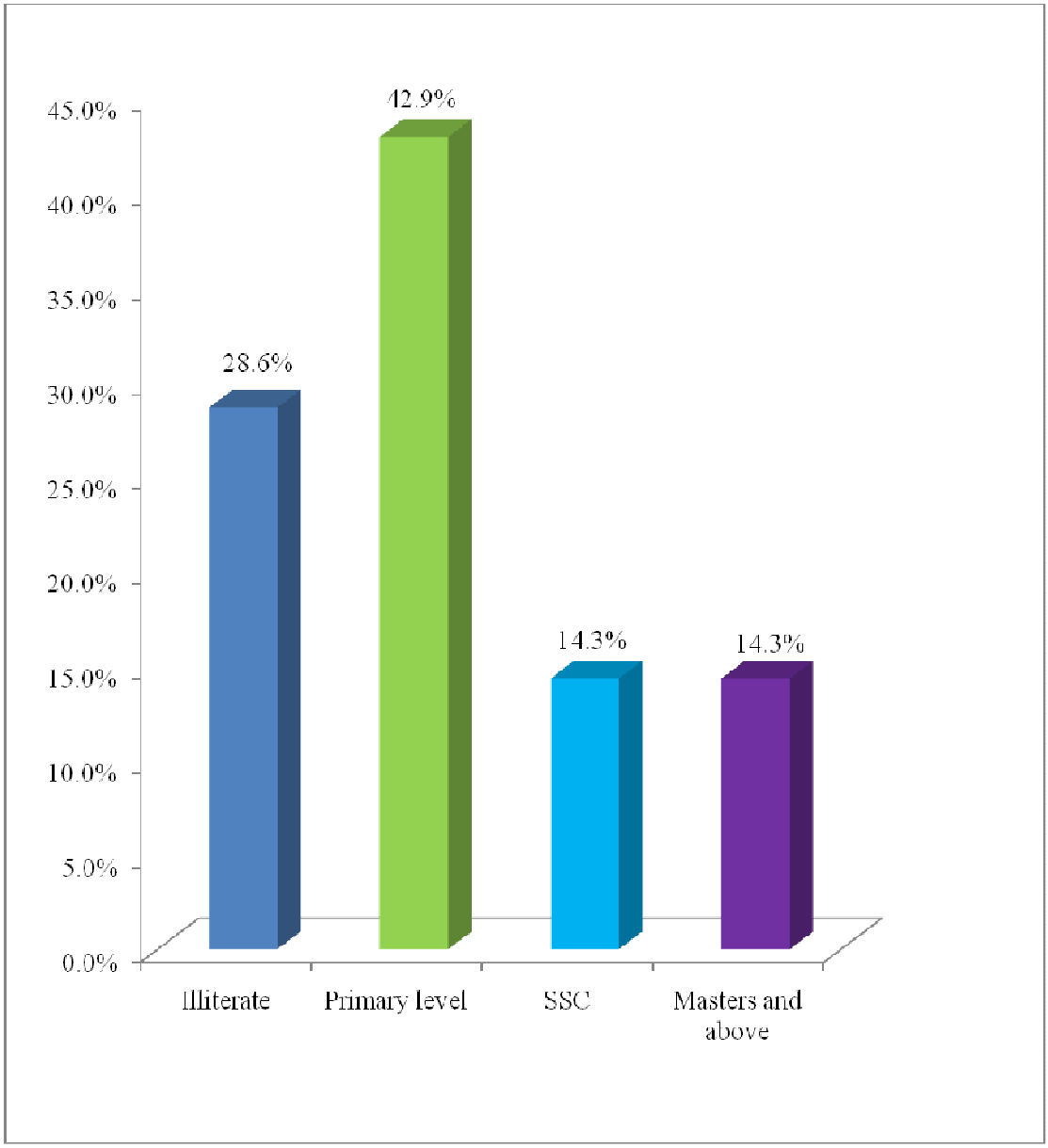


Figure-4: Educational status of the participants.

Living area

Outcome demonstrated that 57.1% (n=4) had lived in rural area and 42.9% (n=3) had lived in urban area out of 7 participants who had lumbar spondylolisthesis (Figure-5).

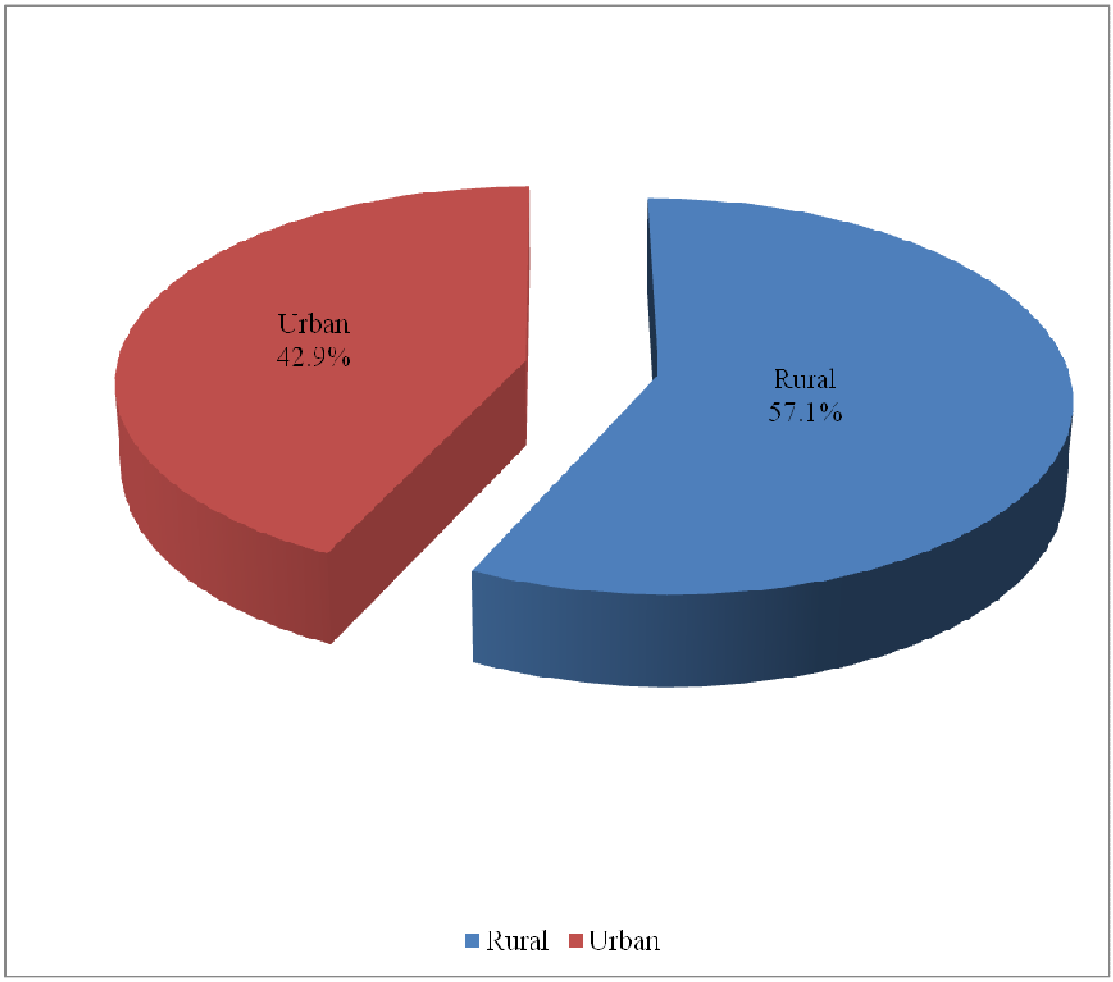


Figure-5: Living areas of the participants.

Occupation

Analysis revealed that among the 7 participants with lumbar spondylolisthesis 14.3% (n=1) was office worker, 57.1% (n=4) were house wifes, 14.3% (n=1) was farmer and 14.3% (n=1) was businessman (Figure-6).

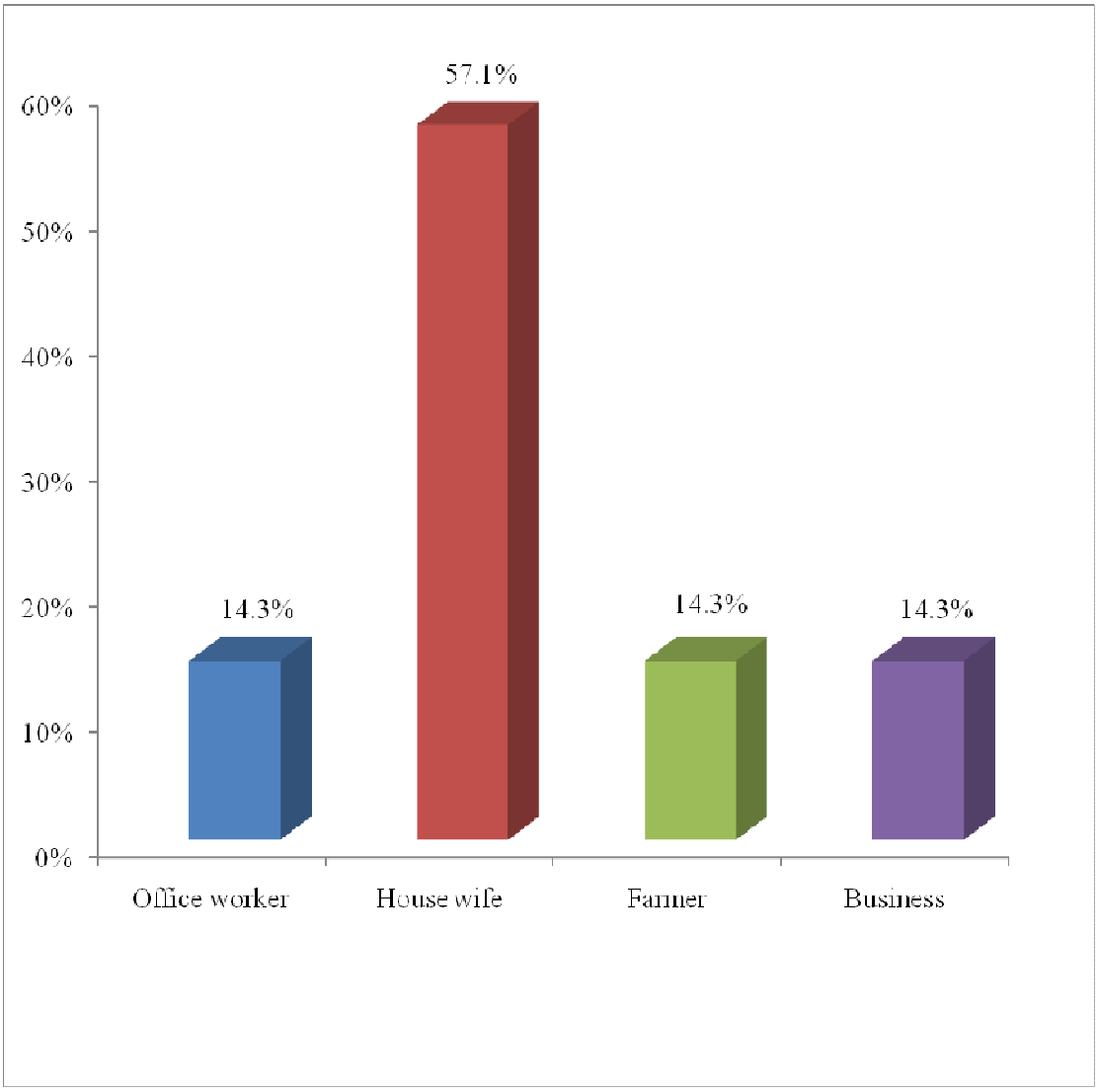


Figure-6: Occupation of the participants.

Family income

Outcome showed that the monthly income was less than 10000 of 42.9% (n=3) participants, in between 10000-20000 of 28.6% (n=2) and more than 20000 of 28.6% (n=2) out of 7 participants with spondylolisthesis (Figure-7).

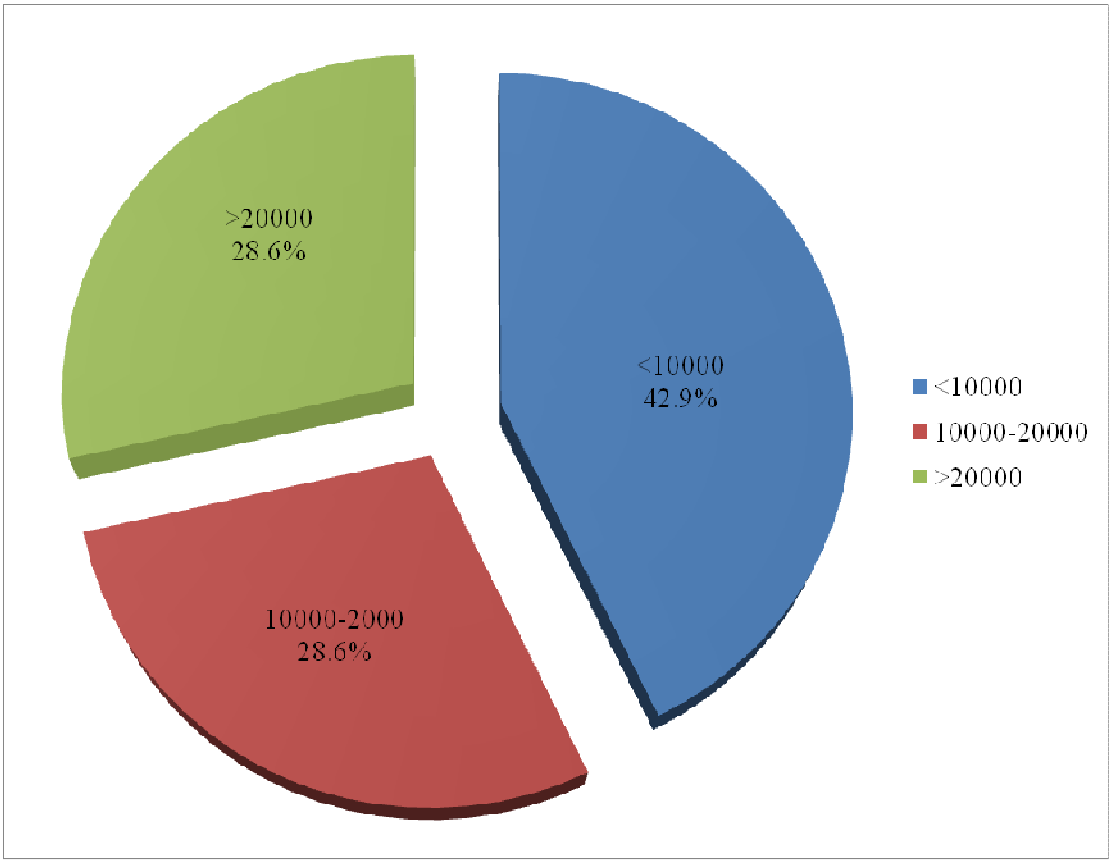


Figure-7: Family income per month of the participants.

BMI (Body Mass Index)

Analysis revealed that 71.4% (n=5) participants were in normal weight and 28.6% (n= 2) were overweight out of 7 participants (Figure-8).

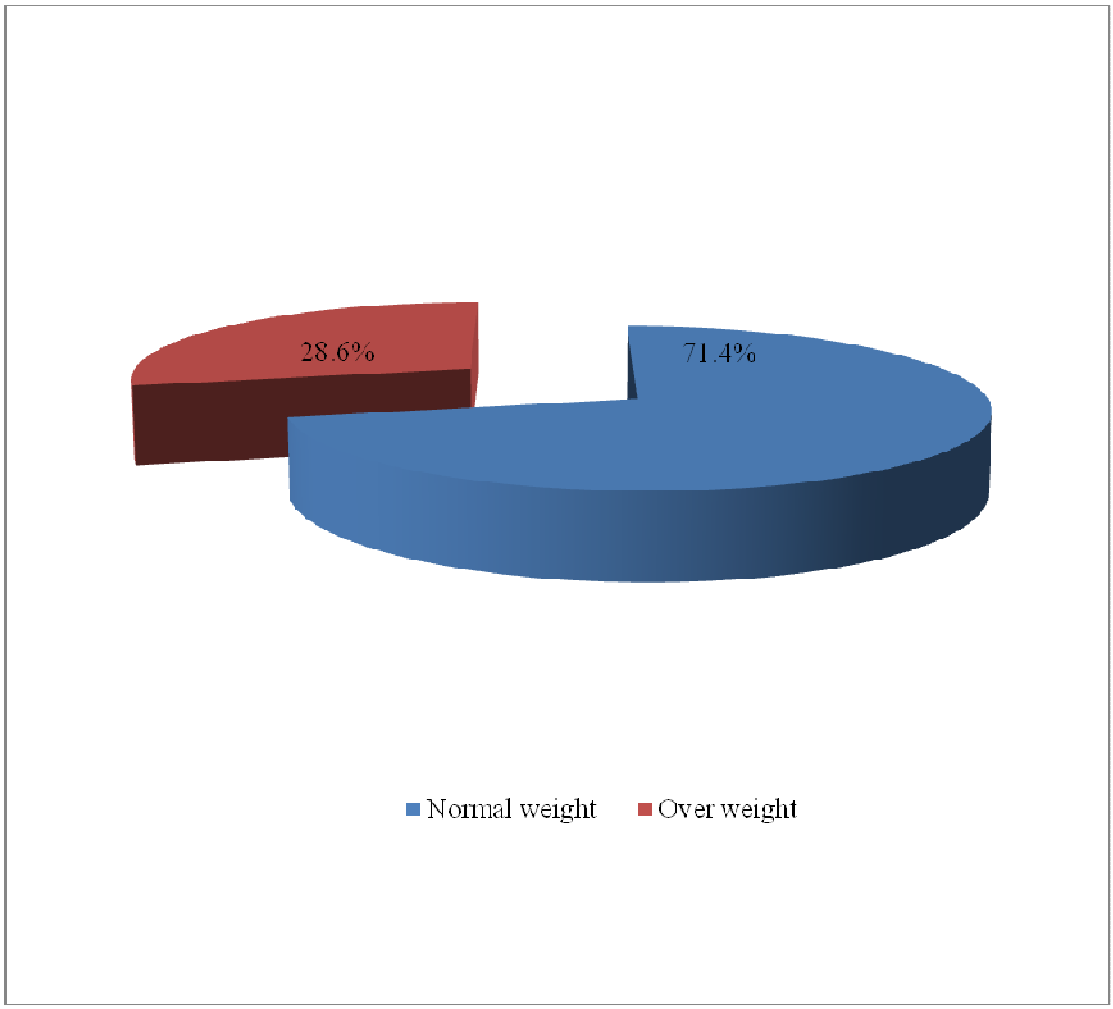


Figure-8: BMI of the participants.

Diagnosis

Outcome showed that among 71 participants 9.9% (n=7) had suffered from lumbar spondylolisthesis, 40.8% (n=29) from PLID, 15.5% (n=11) from spondylosis and 33.8% (n=24) from others condition of low back pain (Figure-9).

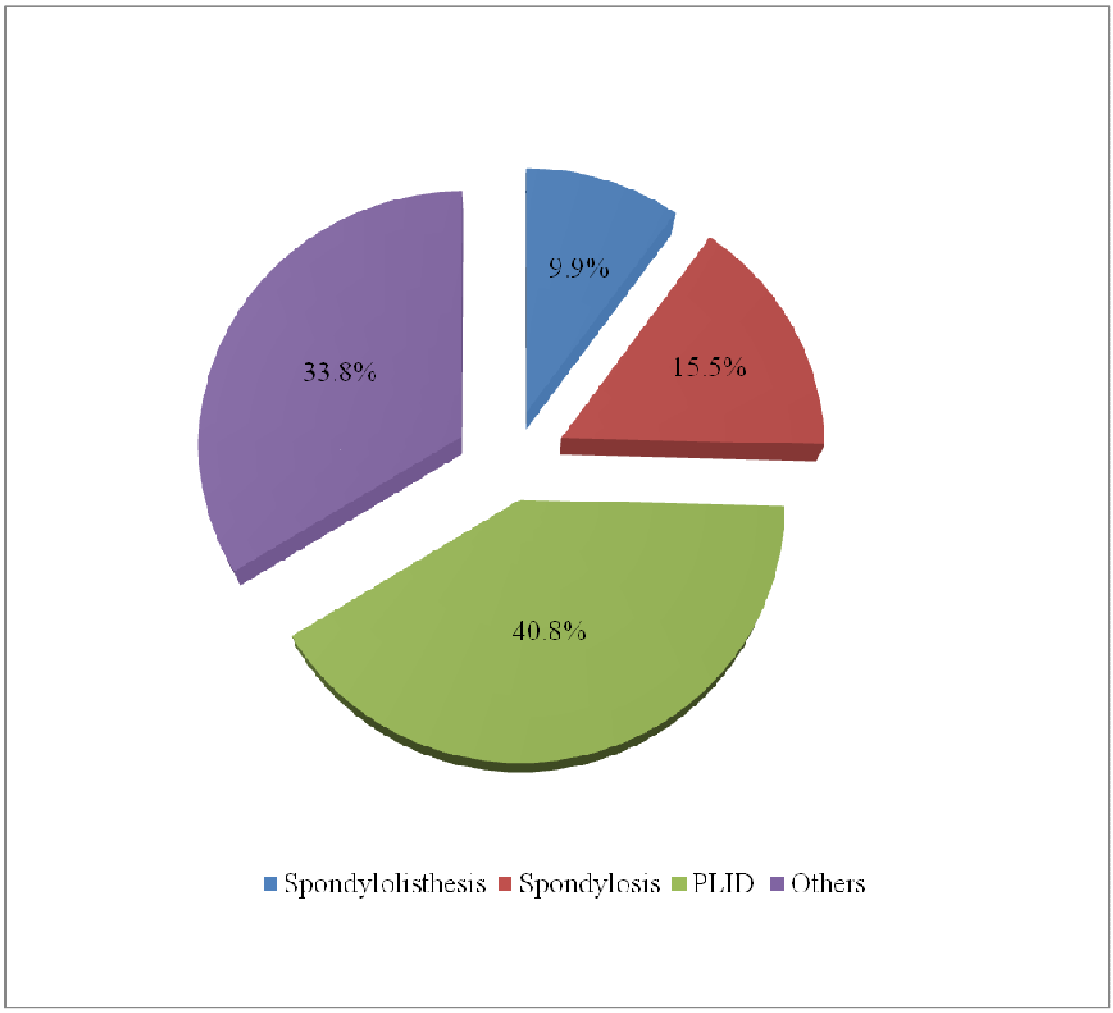


Figure-9: Diagnosis of the condition of the participants.

Level of listhesis

Analysis revealed that the level of listhesis was 71.4% (n=5) at L5/S1, 14.3% (n=1) at L4/5 and 14.3% (n=1) at L3/4 segment among 7 participants (Figure-10).

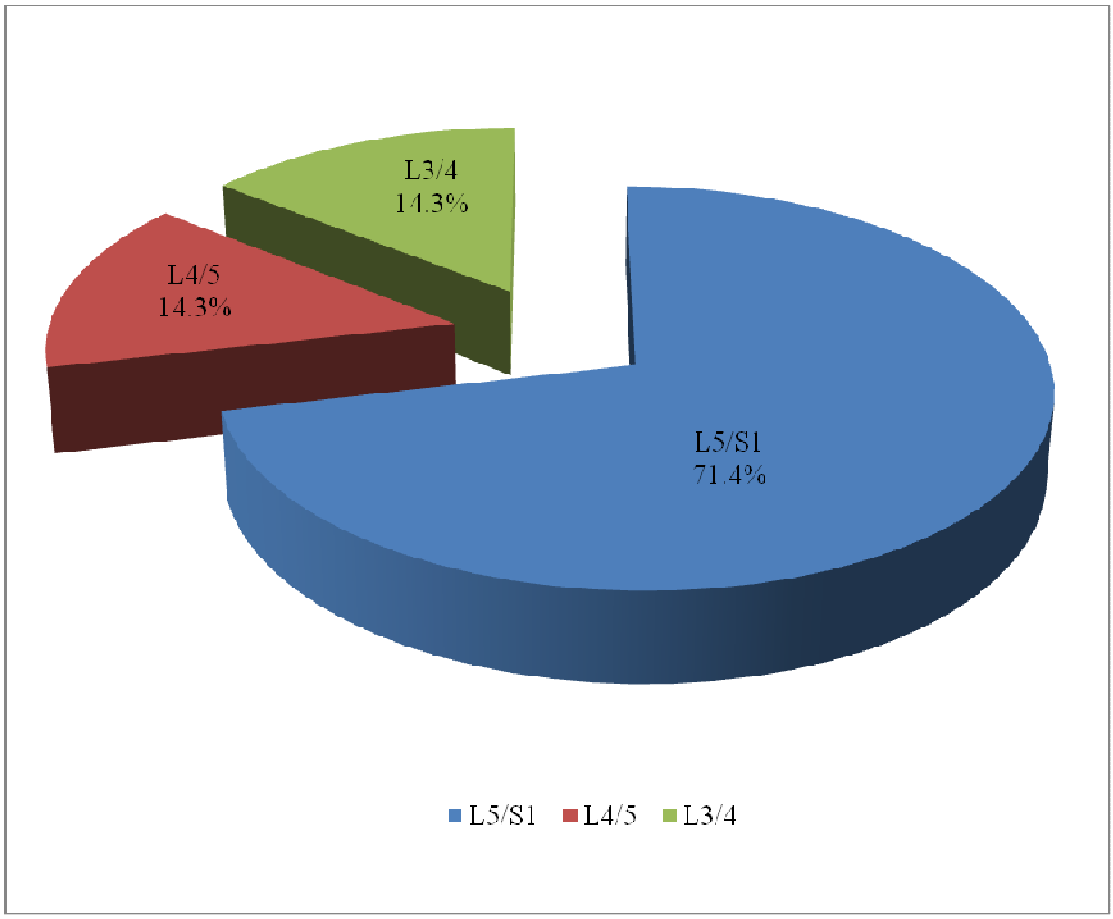


Figure-10: Level of listhesis.

Grade of listhesis

Outcome demonstrated that 71.4% (n=5) participants had Grade I and 28.6% (n=2) had Grade II type of lumbar spondylolisthesis among 7 participants (Figure-11).

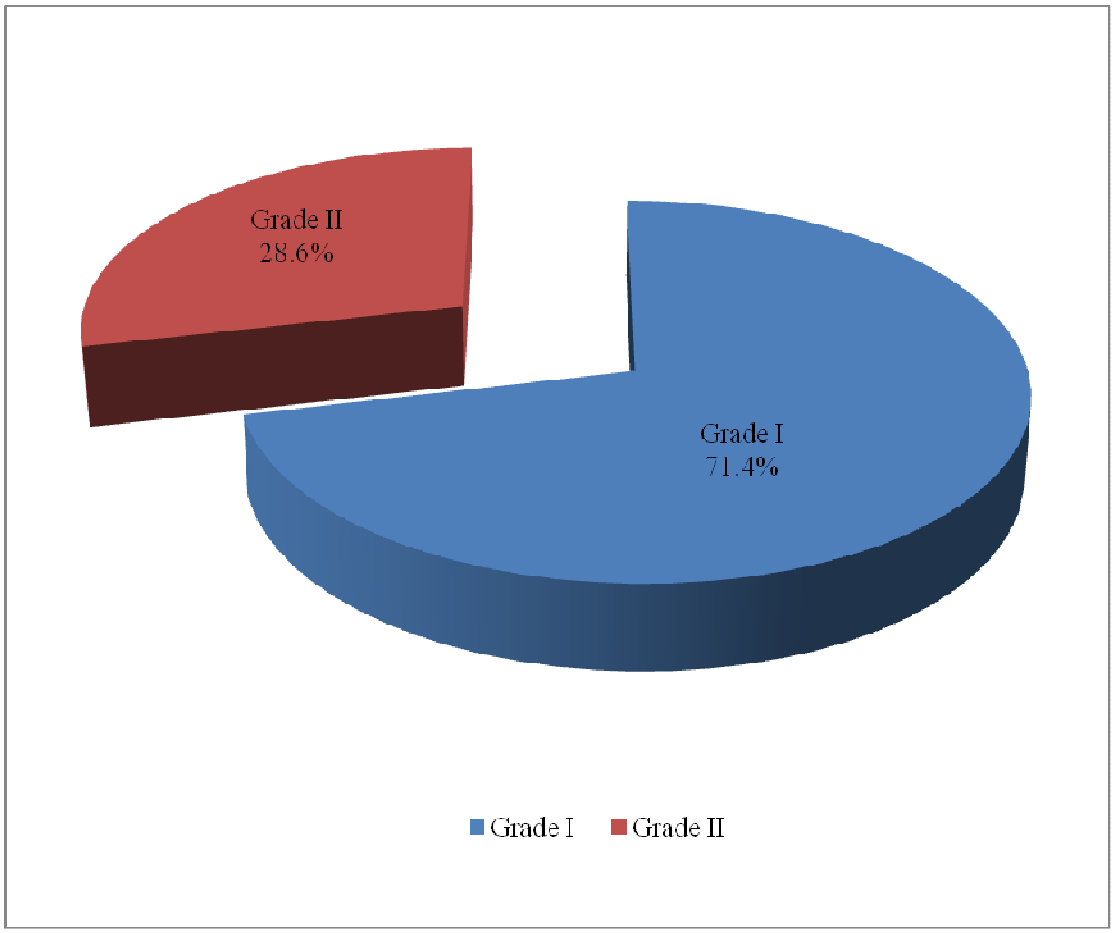


Figure-11: Grade of listhesis.

Job pattern

Analysis revealed that among 7 participants who have lumbar spondylolisthesis 57.1% (n=4) had worked non desk job, 28.6% (n=2) had mixed and 14.3% (n=1) had desk job (Figure-12).

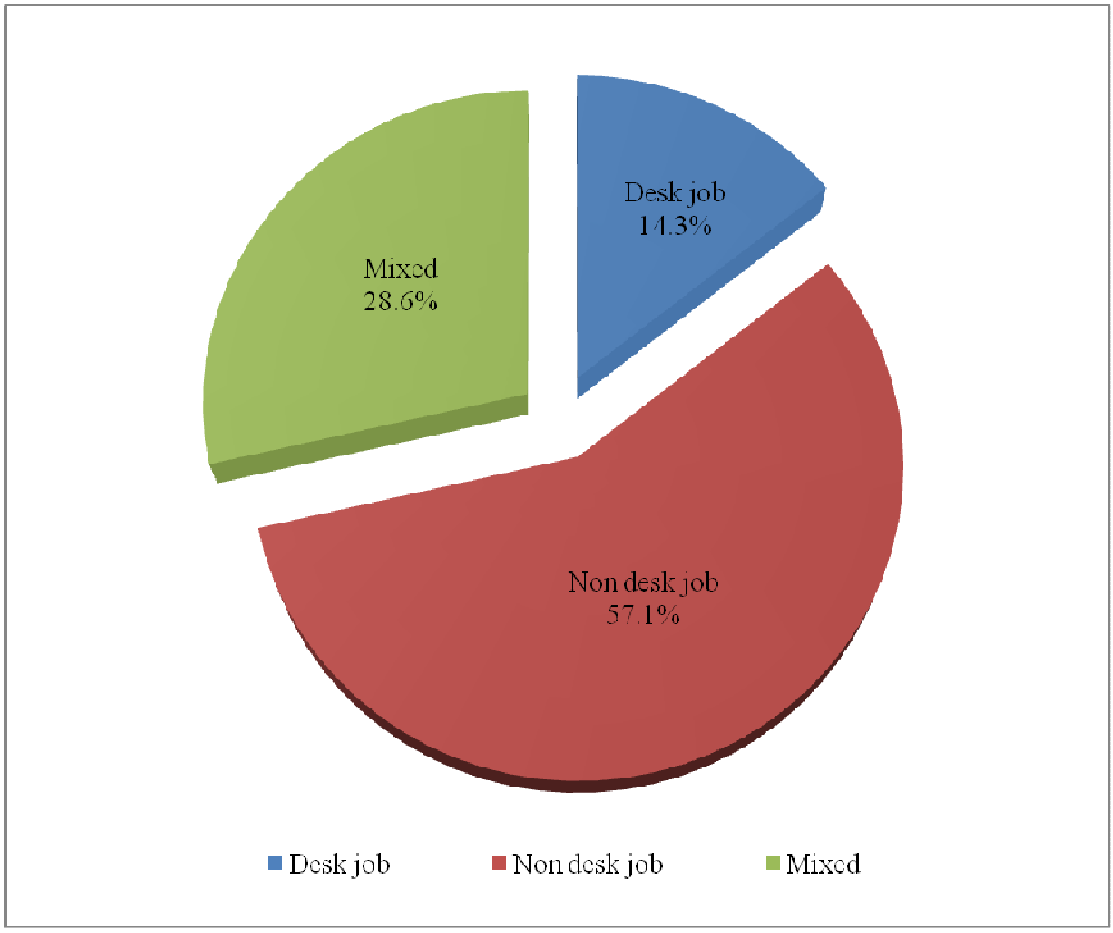


Figure-12: Job pattern.

Radicular pain

Outcome revealed that 71.4% (n=5) had no complain and 28.6% (n=2) had complain of radicular pain out of 7 participants (Figure-13).

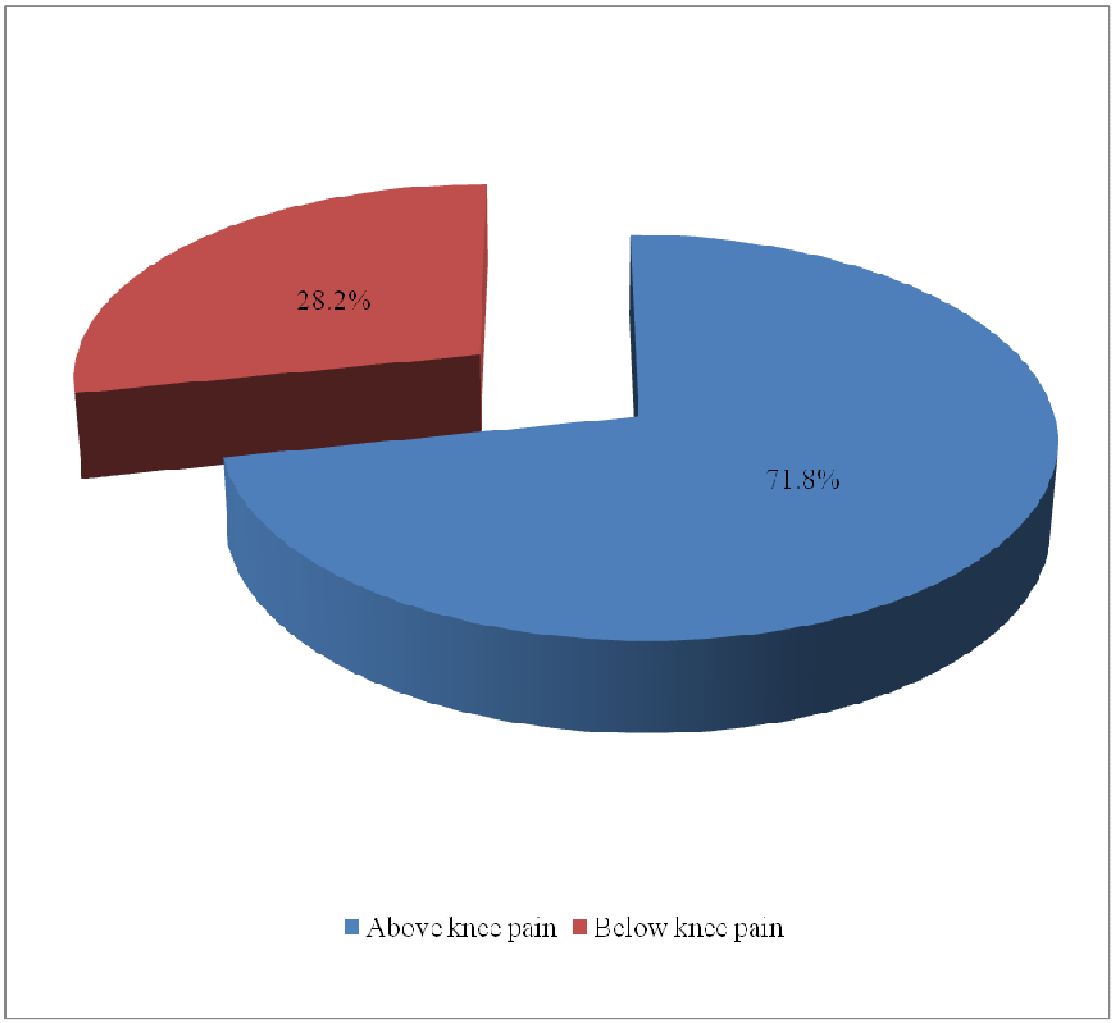


Figure-13: Radicular pain.

History of trauma

Analysis showed that 57.1% (n=4) had and 42.9% (n=3) had no traumatic history out of 7 participants of lumbar spondylolisthesis (Figure-14).

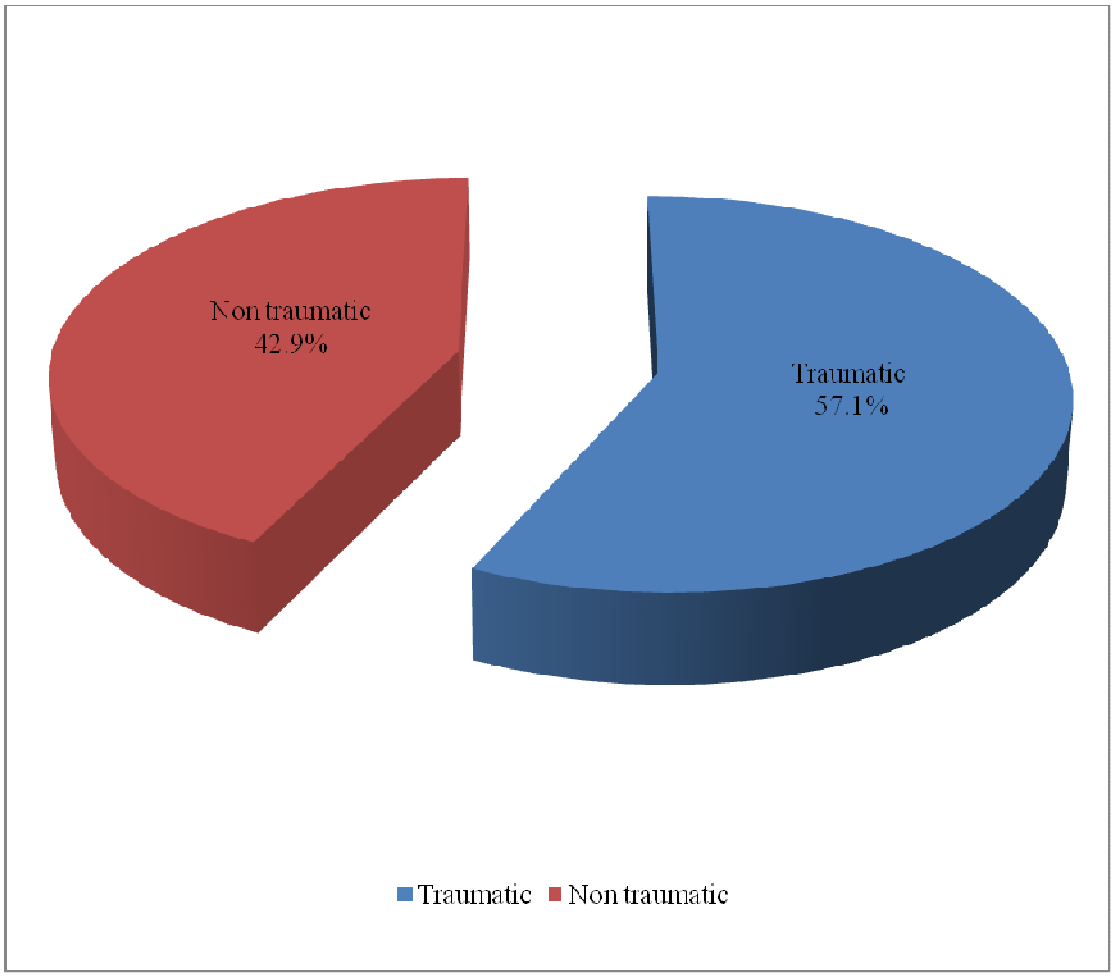


Figure-14: History of trauma.

CHAPTER-V DISCUSSION

This study shows that overall prevalence of lumbar spodylolistheis was 10% which is comparable to the study. In a study in Taiwan, the prevalence of lumbar spodylolisthesis among women was 6% and among men it was 3%. In Denmark, the prevalence of lumbar spodylolisthesis among women was 8% and among men it was 3%. In the US, whereas among women estimates range from 20-25%, 4%–8% in men (Denard et al, 2010).

In this study it was found that more than four fifth 85.7% participants whose age range in between 39-45 years suffered from lumbar spondylolisthesis. In a research in USA Holton et al, 2010 found that susceptibility of the lumbar spondylolisthesis increase with age specifically on the elderly.

Female showed higher incidence 57.1% than male participants 42.9%. Male : Female was 3:4. In USA Abumi et al, in 1990 agreed in his study that the incidence of degenerative spondylolisthesis was approximately four times higher in women before the age of 50 which indicate women were more susceptible than men.

Occupation involving house wife 57.1% shows higher incidence followed by office workers 14.3% and farmer 14.3% respectively. In a study Denard et al, 2010 showed that people with higher levels of physical activity reported frequent incidence of spondylolisthesis.

In a research it was found that prevalence of lumbar spondylolisthesis did not vary by BMI (Holton et al, 2010). This study also agreed with that finding. BMI does not influence in developing lumbar spondylolisthesis. Slightly higher than one fourth 28.6% who have over weight rather than normal BMI 71.4%.

In USA a research on the patient with low back pain Denard et al, in 2010 found that mostly affected level of lumbar spondylolisthesis was L5/S1. This study also showed similar finding, that near about three fourth 71.4% showed higher incidence of lumbar spondylolisthesis at L5/S1 level followed by L4/5 14.3% and L3/4 14.3% respectively.

Grade I showed higher frequency that was almost three fourth 71.4% followed by Grade II 28.6% in this study. A study showed that Grade-I is the most common form of lumbar spondylolisthesis ranged from 5%-28% slip (Dupuis et al, 1985).

Prolonged sitting posture influence to develop lumbar spondylolisthesis. Sitting posture showed higher rate 57.1% followed by bending 28.6% and standing 14.3%. A study was carried out over taxi drivers in Huntington (USA) showed taxicab driving more than 15 years were more prone to develop lumbar spondylolisthesis which indicates prolong sitting posture is a major influencing factor of developing the condition (Chen et al, 2008).

In this study slightly higher than one fourth 28.6% patient complained of radicular pain. In USA it was nearly similar that radiculopathy present 33% among the lumbar spondylolisthesis patient (Denard et al, 2010). Trauma highly influenced 57.1% to develop lumbar spondylolisthesis.

CHAPTER-VI CONCLUSION

Low back pain has great impact causing severe long term physical disability and give rise to huge costs for the society. Everyday a lot of patients of low back pain come to the physician's. Most of them suffered from mechanical deformation of the spinal musculoskeletal structures. Lumbar spondylolisthesis is one of the major cause of mechanical deformation of the spinal musculoskeletal structure. The aim of the study was to find out the prevalence of lumbar spondylolisthesis among the low back pain patients at the selected hospitals in Bangladesh. The results of the current study indicated that prevalence of lumbar of spondylolisthesis among the low back pain patients was almost 10%. Women are more prone than men to develop the condition. Male and female ratio is 3:4. The more affected age range is 39-45 years. In this study it was found that women who were housewife had affected more. BMI does not influence to develop lumbar spondylolisthesis. Spondylolisthesis was observed at L5/S1, L4/5, L3/4 and the most affected area is L5/S1. Grade-I and Grade-II of spondylolisthesis were developed but Grade-I is more. In this study it is found that trauma is one of the major causes to develop lumbar spondylolisthesis.

The investigator has tried to show the prevalence and the possible influencing socio-demographic factors to develop lumbar spondylolisthesis according to participants view. According to the participant view some socio-demographic characteristic (age, occupation and family income), job pattern, prolong bending posture, lifting heavy objects had a positive effect to develop lumbar spondylolisthesis.

It is essential to develop research based findings about the lumbar spondylolisthesis. Proper physiotherapy can reduce the complication of lumbar spondylolisthesis. Like other countries, low back pain patients are likely to be an upcoming burden for Bangladesh. For this reason, it is important to develop research based evidence of physiotherapy practice in this area. Physiotherapist's practice which is evidence based in all aspect of health care. There are few studies on musculoskeletal area in the lumbar region in Bangladesh. These cannot cover all aspect of the vast area. So, it is recommended that the next generation of physiotherapy members continue study regarding this area, this may involve-use of large sample size and participants form

different districts of Bangladesh. Conduct research on other musculoskeletal problems in lumbar spine area where physiotherapist can work. So it is very important to conduct such type research in this area like risk factors of lumbar spondylolisthesis, effectiveness of physiotherapy in lumbar spondylolisthesis.

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APPENDIX - 01

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APPENDIX - 02

Informed consent

Centre: Centre for Rehabilitation of the paralysed (CRP) – Savar

The study entitled "Prevalence of lumbar spondylolisthesis among the low back pain patient attending at the Centre for the Rehabilitation of the Paralysed (CRP)" is a research project. The researcher is a student of Bangladesh Health Professions Institute (BHPI), CRP in 4th year B.Sc in Physiotherapy and it's a part of his study. The participant is request to participate in study after reading the following information.

The study being conducted on, "Prevalence of lumbar spondylolisthesis among the low back pain patients". The aim of the research topic is to determinants the prevalence of lumbar spondylolisthesis among the low back pain patients at CRP in Bangladesh. This will be a Cross Sectional type of study and will helpful for patients.

For the kind information Bangladesh Health Professions Institute (BHPI), CRP has permitted the researcher to do the research. The conversation time will be 20-30 minutes. The participant reserves the right to refuse the study at anytime. The information obtained from the study would be kept confidential and at the time of publishing the result of the study, personal identification of the participants would not be published.

I ……declare that I am giving my consent to participating in the study after being informed about all the information in details.

Yes ☐

No ☐

Signature of the Participant _____

Signature of the Interviewer _____

Signature of the Care giver (Witness)_____

APPENDIX - 03

cÖkœvewj

M‡elYv wk‡ivbvgt wm Avi wc‡Z ‡Kvgi e¨_vi †ivMx‡`i g‡a¨ jv¤^vi ¯cbWvB‡jvwjm‡_wmm Gi nvi

†ivMxi cwiwPwZ
mbv³Kib bs-
AskMÖnbKvixi bvg-
wVKvbv:
mv¶v‡Zi ZvwiL:

cÖkœ bs	cÖkœvewj	DËi	‡KvW
RbmsL¨vZvwË¡K I Av_©mvgvwRKMZ Z_¨			
1.	eqm t		
2.	wj½ t	cyiyl-1, bvix-2	
3.	ˆeevwnK Ae¯’v t	AweevwnZ-1, weevwnZ-2, ZvjvKcÖvß-3, weaev-4	
4.	ag© t	Bmjvg-1, wn›`y-2, †eŠ×-3, wLªóvb-4	
5.	wk¶vMZ †hvM¨Zv t	wbi¶i-1, cÖv_wgK-2, gva¨wgK-3, D”P gva¨wgK-4, mœvZK-5, mœv‡Zv‡KvËi I AwaK-6	

6.	cwiev‡ii aiY t	GKK cwievi-1, †hŠ_ cwievi-2	
7.	AvevwmK GjvKv t	MÖvgxY-1, bMi¯’-2,	
8.	‡ckv t	Awdm kªwgK-1, w`bgRyi-2, PvjK-3, M„nxwb-4, K…lK-5, ‡eKvi-6, Aemicªvß-7, QvÎ-8, e¨emvqx-9	
9.	cwiev‡ii gvwmK Avq t	..... UvKv	
10.	we‡bv`b t	‡Ljva~jv-1, Dcb¨vm cov-2, cwÎKv cov-3, AvÇv-4, †Uwjwfkb †`Lv-5, gvQ aiv-6, Ab¨vb¨-7	
11.	we.Gg.AvB.	m¡vfvwe‡Ki †P‡q Kg IRb-1, m¡vfvweK IRb-2, m¡vfvwe‡Ki †P‡q †ewk IRb-3, ¯’~j-4	
12.	†ivM mbv³KiY t	¯cbWvB‡jvwjm‡_wmm-1, wc.Gj.AvB.wW-2, ¯cbWvB‡jvjvBwmm-3, Ab¨vb¨-4	
13.	¯cbWvB‡jvwjm‡_wmm n‡j Zvi †j‡fj t	(Gj 1/ Gm 1)-1, (Gj 4/5)-2, (Gj 3/4)-3, (Gj 2/3)-4, (Gj 1/2)-5, cªhR¨ bq-6	
14.	wjm‡_wmm Gi †MÖW t	(†MÖW 1)-1, (†MÖW 2)-2, (†MÖW 3)-3, (†MÖW 4)-4, (†MÖW 5)-5, cªhR¨ bq-6	
Kv‡Ri aib			
15.	Kv‡Ri aib t	†Uwej wfwËK KvR-1, gvVwËK KvR-2, wgkªY-3	
16.	Kg©¯’‡ji A½web¨vmMZ Ae¯’vb t	Dc‡ekb -1, `ÛvqgvB -2, †Kvgi SzKvb-3, nuvUv-4	
17.	Kv‡Ri mgqKvj t	(<8)-1, (8-10)-2, (10-12)-3, (>12)-4	
18.	Aemi mgqKvj t	(<3)-1, (3-5)-2, (>5)-3	
19.	†Kvgi evKv‡bv t	NbNb-1, c&ªvqB/gv‡Sgv‡S-2, K`vwPr/KLbI bv-3	
20.	†Kvgi ‡gvPov‡bv t	NbNb-1, c&ªvqB/gv‡Sgv‡S-2, K`vwPr/KLbI bv-3	

21.	fvie¯Íy D†Ëvjb t	†ewki fvM mgq-1, c&ªvqB-2, gv‡Sgv‡S-3, K`vwPr/KLbI bv-4	
e¨_vi aib			
22.	†Kvgi e¨_vi Kvi‡b mgm¨vq co‡Z nq t	K`vwPr-1, gv‡Sgv‡S-2, †ewki fvM mgq-3	
23.	‡idvW© e¨_v t	‡Kvg‡ii gvSLv‡b-1, wbZ¤^-2, Diæ-3, cv-4, †idvW© e¨_v bvB-5	
24.	Aek/AmviZv t	memgq-1, gv‡Sgv‡S-2, Aekfve bvB-3	
AvNvZ welqK			
25.	†Kvg‡i AvNv‡Zi BwZnvm t	NbNb-1, c&ªvqB/gv‡Sgv‡S-2, K`vwPr/KLbI bv-3, AvNv‡Zi BwZnvm bvB-4	
26.	AvNv‡Zi KviY t	mivmwi AvNvZ-1, †Kvgi euvKvbRwbZ AvNvZ-2, fvie¯Íy D†ËvjbRwbZ AvNvZ-3, fvie¯Íy enbRwbZ AvNvZ -4	
27.	†Ljva~jvi mv‡_ m¤ú„³Zv t	dzUej-1, wµ‡KU-2, ev‡¯‹Uej‡ 3, fwjej-4, G¨v_‡jU&m-5, nwK-6, †Ljva~jvi mv‡_ m¤ú„³Zv †bB-7, Ab¨vb¨-8	

APPENDIX - 04

Title: Prevalence of lumbar spondylolisthesis among the low back pain patients attending at CRP

Questionnaire form

Patient's Identification
Identification Number:
Name of respondents:
Address:
Date of interview:

QN	Questions	Criteria	Response Code
Socio-demographical factors			
1.	Age :		
2.	Gender/Sex:	Male-1, Female-2	
3.	Marital status :	Unmarried-1, Married-2, Divorced-3, Widowed-4	

4.	Religion:	Islam-1, Hinduism-2, Christianity-3, Buddhist-4	
5.	Educational status :	Illiterate-1, Primary level-2, SSC-3, HSC-4, Graduation-5, Masters and above- 6	
6.	Family type :	Single family-1, Joint family-2	
7.	Living areas :	Rural-1, Urban-2,	
8.	Occupations:	Office worker-1, Daily laborer-2, Driver-3, House wife-4, Farmar-5, Unemployed-6, Retired-7, Student-8, Bussiness-9	
9.	Family income per month:	.....Taka	
10.	Entertainment:	Sports-1, Reading novel-2, Reading newspaper-3, Gossiping-4, Watching telivision-5, Fishing-6, Others-7	
11.	BMI: (kg/m²)	Under weight-1, Normal weight-2, Over weight-3, Obese-4	
12.	Diagnosis	Spondylolisthesis-1, Spondylosis-2, PLID-3, Others-4	
13.	If spondylolisthesis, level of listhesis:	(L5/S1)-1, (L4/5)-2, (L3/4)-3, (L2/3)-4, (L1/2)-5 Not applicable-6	
14.	Grade of listhesis	Grade I-1, Grade II-2, Grade III-3, Grade IV-4, Grade V-5 Not applicable-6	
Job pattern			
15.	Job pattern:	Work at desk -1, Work away from desk-2, Mixed-3	
Answering the following question from 16-22 considering before the condition occurs.			
16.	Which posture do you maintain most of the time during activity:	Sitting-1, Standing-2, Bending-3 Walking-4, Squatting-5	
17.	Duration of activity (hours):	(<8)-1, (8-10)-2, (10-12)-3, (>12)-4	
18.	Leisure time (hours):	(<3)-1, (3-5)-2, (>5)-3	
19.	Bending:	Very frequently-1, Often/sometime-2, Never/rare/seldom-3	

20.	Twisting:	Very frequently-1, Often/sometime-2, Never/rare-3	
21.	Lifting heavy objects:	Most of the time/always-1, Often-2, Sometimes-3, Never/seldom-4	
Nature of pain			
22.	Frequency of being bothered by back pain:	Rarely-1, Some of the time-2, Most of the time-3	
23.	Radicular pain:	Centralize and low back region-1,Buttock region-2, Thigh-3, Leg-4, No radicular pain-5	
24.	Paresthesia:	Continuous-1, Intermittent-2, No paresthesia-3	
Trauma			
25.	History of trauma:	Very frequently-1, Often/sometime-2, Rare/seldom-3, No history of trauma-4	
26.	Cause of trauma:	Direct trauma-1, Twisting-2, Lifting heavy object-3, Carrying heavy object-4	
27.	Involvement with sports:	Football-1, Cricket-2, Bascketball-3, Volleyball-4, Athlets-5, Hockey-6, No involvement with sports-7,	