



## Original Article

## Prevalence, Risk Factors and Functional Disability Related to Foot Drop in Lumber Degenerative Diseases

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## ABSTRACT

In recent years, foot drop and lumber degenerative changes have become increasingly prevalent. These changes can be serious, necessitating immediate medical attention. **Objective:** To identify any risk factors that may be increasing patients' chances of experiencing foot drop and to observe functional disabilities related to foot drop including pain, foot wear, gait and foot posture. **Methods:** Data was collected through standardized tool to assess status of affected foot in lumber degenerative diseases. Variables which were considered in this tool are status of pain of the patient by asking directly to the person, any foot orthosis usage by the patient, daily activity status of the patient, range of motion of the foot, **Results:** Twenty participants (7.4%) were between the ages of 65 and 75; 154 (55.6%) were between the ages of 55 and 65; 63 (23.2%) were between the ages of 45 and 55; 26 (9.6%) were between the ages of 35 and 45; and nine (3.3%) were between the ages of 25 and 35. There were 193 (70.7%) participants with outstanding feet, 46 (16.8%) with good feet, 7 (2.6%) with fair feet, and 26 (9.5%) with terrible feet. **Conclusions:** The majority of participants (90.4%) fall into the excellent, decent, and fair categories and don't exhibit any foot drop. The prevalence of foot drop was precisely 9.55%.

## INTRODUCTION

There has been an increase in the incidence of foot drop and lumber degenerative changes recently. These changes can be serious and require immediate medical attention. As a result, we frequently engage in tasks that require the spine to bend and twist without the proper tools or knowledge. Therefore, compared to the western world, we anticipate seeing more lumber spinal disorders [1]. Disc degeneration is frequently brought on by normal daily strains and small traumas, which cause spinal discs to gradually lose water as their hard outer shells, known as their annuli, deteriorate. This may result in pressure being placed on the spinal column's nerves, resulting in discomfort and weakness. The nerve leading to the peroneal nerve is compressed by a variety of lower back conditions. The big toe and first toe are also affected, as

well as the ankle and foot [2]. The most likely cause of low back stiffness and leg pain is a herniated disc in the lumber, along with spinal stenosis, facetar arthropathy, PIVD, as well as spondylolisthesis. However, disc herniation and stenosis are the most prevalent in adults. The L4/5 spinal level is the one which is substantially impacted [3]. The normal degeneration of a spine's intervertebral disc is recognized to as degenerative disc disease (DDD). Any adjustment to the annulus's form that causes it to bulge outside of its usual range is known as herniation. Stenosis, which is caused by the degeneration of vertebrae, discs, muscles, and ligaments, is the narrowing of the lumbar canal's open areas [4]. The neurological problems caused by lumber degenerative disease (LDD) include sensory flaws, bowel and bladder dysfunctions, as well as motor

defects [5]. Foot drop, which is typically unilateral in nature, is one of the most prominent motor abnormalities in adults with LDD. Drop foot is a phrase used to explain when impairments in LDH with LR lead motor to restricted ankle and/or toe dorsiflexion. Symptoms of foot drop and lumbar degenerative changes vary from person to person depending on the severity of the condition. Individuals in the early stages of the disease may experience mild symptoms such as tingling in the feet and muscle weakness in one leg [6]. According to one theory, the impact of a disc herniation relies on its amount of displacement, size, and extent in relation to the spinal canal. In individuals who were experiencing an early onset, or later onset phase of its affects, foot drop was seen to develop more frequently. In fact, motor impairment was the first presenting symptom for a number of individuals in the foot drop group. Contrary to popular assumption, neuro-deficiency is not more prevalent in chronically and repeatedly damaged nerve roots [7]. Drop foot syndromes may result in degenerative lumbar disease if the disc between Lumbar fourth and fifth (20%), between Lumbar fifth to sacral 1st (41.5%), or isolated 5th lumbar (25.2%) nerve roots are compressed. Patients with L5 radiculopathy may also have decreased knee (PTR) and ankle (ATR) reflexes in addition to dorsiflexion palsy. Usually, back pain is almost often accompanied by lumbar abnormalities, a clinician should look for a foot drop imposed by the vertebrae [8]. Ankle dorsiflexion palsy is a neurological impairment which is the physical presentation of drop foot. Lumbar degenerative disorders (LDDs), such as (LDH) and lumbar spinal stenosis, cause drop foot in 0.6-7.7% according to reports (LSS). A surgical recovery rate of 61-84%, drop foot secondary to LDDs, might occasionally occur [9]. The prevalence of Difficulty in dorsiflexion (MMT 3) in stenosis cases is said to range from 5% to 12% overall, per Guigui's research. It is uncommon for lumbar stenosis to cause a severe motor impairment. According to the authors' observations, 8% of people have motor weakness that is classified at 3 or lower. When there is a further discal herniation and when the stenosis extends to three or more levels, this sign of nerve dysfunction occurs more frequently [10]. Physical examination and history-taking are two methods that can be used to evaluate foot drop. Medical Research Council (MRC) grading has been used in numerous studies to evaluate the strength of the tibialis muscle of foot, the range motion, and gait, as well as foot placement. Patients with a drop foot find it extremely challenging to walk in regular shoes, sandals, or slippers because of the ensuing "steppage gait." The strength of the tibialis anterior muscles can be assessed using the manual muscle test. A score of less than 3 out of 5 is thus considered a drop foot [11]. For the evaluation of the foot, numerous studies have

employed a score system known as the Stanmore assessment tool. This grading system has seven categories: pain, the requirement for an orthosis, the ability to wear regular shoes, activity level, ankle dorsiflexion muscular power, degree of active ankle dorsiflexion, and foot posture. The overall result is 100. Through this scale, we could be able to assess functional status of foot [12]. Patients' demographic traits, which are connected to the underlying lumbar disorders, are risk factors for lumbar degenerative illnesses. For instance, male patients are more prevalent than female patients and range in age from 30 to 60 for foot drop caused by disc herniation. According to our knowledge, disc disease is rare in the first 20 years of life and reaches its peak in the 4th decade. It affects guys greater than in females. The bottom two levels Over 95% (50% are attributable to L4 and L5 and 46% of L5 and S1 respectively) of herniation. Although symptoms are easily observed but their inconsistency of onset makes it difficult to find any specific trend or pattern of appearance [13]. Diabetes mellitus, history of trauma, and other factors can increase the likelihood of foot drop and have an indirect or direct impact on how lumbar degeneration affects a person [14]. Smoking and obesity are two more comorbidities linked to lumbar degenerative disease. Obesity is defined by the WHO as having a (BMI) of 30 or more. The proliferation and survival of disc cells have been directly influenced by elevated glucose concentrations in DM, which has been considered, associated directly to disc degeneration. These additional factors contribute to developing of foot drop in lumbar degenerative disease. With these risk factors deteriorate the functional status and ADL's of the person [15]. The purpose of this study was to get an insight that how much prevalent foot drop is in Gujranwala division along with lumbar degenerative disease (including lumbar disc herniation, lumbar stenosis, and PIVD). Additionally, it is important to identify any risk factors that may be increasing patients' chances of experiencing foot drop, so that people can take preventive measures in order to be safe from these issues. Other than prevalence and risk factors, we are observing functional disabilities related to foot drop including pain, foot wear, gait and foot posture for gaining knowledge that how much foot drop effects a person's daily life.

## METHODS

This was an Observational cross-sectional study. A total of 272 patients of Lumbar degenerative disease from Tertiary hospitals or health care setups in Gujranwala division were included in this study through simple random sampling technique. Inclusion criteria comprises of the patients with Age from 2nd to 7th decade of life (20-75+) and Reported

lumber degenerative cases (including disc herniation, lumber stenosis and PIVD). Exclusion criteria comprises of the patients with Peroneal peripheral neuropathy, Peripheral nervous system pathology, Central nervous system pathology, Upper motor neuron lesion, Lower motor neuron lesion, Inflammatory neuropathy, Intraneural tumor, Iatrogenic factors (surgical procedure and use of anesthesia) and Etiologies such as Paget's disease [16], Baker's cyst [17], Hodgkin's lymphoma [18]. Data were collected through standardized tool to assess status of affected foot in lumber degenerative diseases which is semi-modified according to need of our research. Demographic data contained name, age, gender, occupation and type of lumber degenerative disease. It also includes risk factors such as trauma, diabetes [3], obesity, smoking and vascular disease; which was concluded through history taking of the patient. Variables which were considered in this tool are status of pain of the patient by asking directly to the person, any foot orthosis usage by the patient, daily activity status of the patient, range of motion of the foot, MRC grading of the foot for assessing power of the foot by inspection and lastly foot posture. Each variable or question have scores; all together makes up 100. Result achieved by adding up scores. 85 TO 100 was an excellent which means no foot drop, 70 to 84 is good means little to no drop foot, 55-69 was fair meaning partial foot drop and less than 55 was poor means complete foot drop. Data were entered and analyzed through statistical package for social sciences (SPSS) 24.0. For descriptive analysis mean and standard deviation was calculated for quantitative or numerical data. Whereas frequencies and percentages were calculated for qualitative variables. Appropriate graphical representation was done. For inferential analysis, appropriate statistical tests i.e., Pearson's correlation coefficient, Pearson chi-square and spearman correlation were applied. Level of significance or Confidence Interval is (95%), and all data were analyzed at 95% confidence interval and p-value less than an equal (0.05) was considered as significant value.

## RESULTS

The research's goal was to determine the relationship between foot drop and the prevalence of the condition in persons aged 25 and older. Data from 272 participants were collected for the study. Twenty participants (7.4%) were between the ages of 65 and 75; 154 (55.6%) were between the ages of 55 and 65; 63 (23.2%) were between the ages of 45 and 55; 26 (9.6%) were between the ages of 35 and 45; and nine (3.3%) were between the ages of 25 and 35 (Table 1). 63.24% of participants were male, compared to 36.76% of female participants. Among the participants, 81 (29.8%) worked in offices or had other sedentary

occupations, 120 (44.1%) performed heavy work, 52 (19.1%) were housewives, and 19 (7%) did nothing. 7 (2.6%) of the population was underweight, 177 (65.1%) were of normal weight, 12 (4.4%) were overweight, and 76 (27.9%) were obese. 33 (12.1%), 108 (39.7%), and 131 (48.2%) of the subjects had PIVD and disc herniation, respectively. A total of 133 patients (48.9%) reported no pain, 103 reported mild pain (37.9%), 24 reported moderate pain (8.8%), and 12 reported severe pain (4.4%) (Table 1).

DEMOGRAPHIC DATA		
Categories		n (%)
AGE	65-75	20(7.4%)
	55-65	154(56.6%)
	45-55	63(23.2%)
	35-45	26(9.6%)
	25-35	9(3.3%)
OCCUPATION	Office or sitting job	81(29.8%)
	Labor	120(44.1%)
	House wife	52(19.1%)
	Null	19(7%)
BMI	Overweight=25-29.9	7(2.6%)
	Normal weight=18.5-24.9	177(65.1%)
	Overweight=25-29.9	12(4.4%)
	Obesity =BMI of 30 or <	76(27.9%)
DISORDER	Disc herniation	108(39.7%)
	PIVD	33(12.1%)
	SPINAL STENOSIS	131(48.2%)
PAIN	No Pain	133(48.9%)
	Mild Pain	103(37.9%)
	Moderate pain	24(8.8%)
	Severe Pain	12(4.4%)
GENDER	Male	172(63.2%)
	Female	100(36.8%)
	Total	272(100%)

**Table 1:** Demographic data of the participants

There were 193 (70.7%) participants with outstanding feet, 46 (16.8%) with good feet, 7 (2.6%) with fair feet, and 26 (9.5%) with terrible feet. Foot drop was identified in 26 (9.6%) subjects whereas it was absent in 246 (90.4%) (Table 2).

FOOT DROP STATUS	
	Frequency (%)
Excellent	193(70.7%)
Good	46(16.8%)
Fair	7(2.6%)
Poor	26(9.5%)
PREVALANCE OF FOOT DROP	
	Frequency (%)
YES	26(9.6%)
NO	246(90.4%)
Total	272(100%)

**Table 2:** Foot drop status and prevalence in participants

While 37.13% (101) of the participants did not have foot drop but did have DM, 2.94% (8) of them did, and 53.31% (145) did

not, 6.62% (18) of them had foot drop and DM. 6.35% (17) people had foot drop but no trauma, 63.60% (173) did not have foot drop or trauma, and 3.31% (9) participants had both foot drop and trauma. In contrast, 26.84% (73) participants did not have foot drop but did have trauma. Foot drop and vascular disease were both present in 2.94% of patients (8), 20.59% (56) did not have foot drop but did have vascular disease, 6.62% (18) had foot drop but not vascular disease and 69.85% (190) did not. 5.88% (16) of the individuals had foot drop in addition to obesity, compared to 20.22% (55) who did not have foot drop but did have obesity, 2.57% (8) who did have foot drop but did not have obesity, and 65.07% (190) who did not have either condition (Table. No.3). Participants with foot drop included 3.31% (9) who also smoked, 30.15% (82) who did not have foot drop but did smoke, 6.25% (17) who did not have foot drop and did not smoke, and 164 who did not have foot drop or smoke (Table 3).

RISK FACTORS				RISK ESTIMATES				
Association	Prevalence of Foot drop		Total	Chi-square	P-Value	Odds Ratio	95% Confidence Interval	
	Yes	No					Lower	Upper
DM	Yes	18	101	7.585	0.006	3.23	1.35	8
	No	8	145					
Trauma	Yes	9	73	0.273	0.602	1.255	0.54	3
	no	17	173					
Vascular Dx	Yes	8	56	0.837	0.36	1.508	0.62	4
	No	18	190					
Obesity	Yes	18	56	25.63	0	7.63	3.152	14.88
	No	8	190					
Smoking	Yes	9	82	0.017	0.895	1.059	0.45	2
	No	17	164					
TOTAL		26	246	272				

**Table 3:** Risk factor analysis and estimation of patients

## DISCUSSION

The current investigation found that, despite the extremely low likelihood 9.55%, according to our study, individuals with lumbar degenerative alterations such stenosis, herniation, and PIVD may develop foot drop. The study was conducted in the Gujranwala district of Pakistan with the goal of determining the prevalence of foot drop in 372 patients with Lumbar Degenerative Disease. To determine each patient's functional state, the MMT (Manual Muscle Testing) and ROM (Range of Motion) of anterior tibialis muscle were utilized. To ascertain the prevalence of foot drop and associated risk variables, a modified questionnaire (the Stanmore questionnaire) was employed. To describe the prevalence of foot, drop in the Indian population and identify the contributing causes, cross-sectional observational research of the "International Journal of Allied Medical Sciences and Clinical Research of a nationwide health survey" was done.

The investigation was carried out over a period of six months in the OPD of Dr. Ulhas Patil Medical College & Hospital, Jalgaon. The research covered all civilians who were 25 years of age or older. This study indicated that 8% of patients with lumbar degenerative disease had foot drop, and that the majority of these patients had intervertebral disc prolapse and untreated lumbar spinal stenosis. Similar findings of 9.55%-foot drop in patients were obtained. The disparity in sample sizes is what causes the variation in foot drop prevalence. Pakistani citizens experience lumbers degenerative illness. Males were more likely than females to have foot drop, according to an Indian study. In this aspect, our findings are consistent with this perspective of earlier studies. Young individuals are harmed less and less, whereas older people suffer more. The 55-65 age group was particularly impacted. According to our research, 63(23.2%) of the participants were aged 45 to 55. Additionally, people who have heavy duty work are more likely to be afflicted, and a prior study found that farmers are the most impacted group [19]. Another research was conducted at the "Department of Orthopedic Surgery, Shanghai Chang Zheng Hospital, Second Military Medical University, Shanghai, China." The purpose of this study was to investigate the clinical features and prognostic factors of foot drop caused by spinal degenerative disease. 8.1% of all patients with spinal degenerative disease exhibited foot drop, compared to our 9.55%. Patients who had experienced paralysis for a shorter time, had TA muscles that were stronger, and were younger had improved functional status. These linkages are pertinent to our study in this way. Our research indicates that younger populations are less impacted. Muscle strength is the key indicator of foot functioning. Of the participants, nine (3.3%) and 26 (9.6%) were between the ages of 25 and 35 [5]. A study of the risk factors for 236 individuals set out to identify the factors that contribute to foot drop in lumbar disc herniation patients. 52 out of 236 persons (22.9%), in contrast to the results of our experiment, displayed foot drop. In our study, diabetes mellitus increased the risk of foot drop. There were 272 persons in the sample, or 2.94 percent, who had diabetes. Patients with diabetes mellitus were shown to have a lower likelihood of lowering their foot (P=0.006). Patients were more likely to develop diabetes mellitus if they had foot drop. Diabetes was seen in 19.2% of the participants in the neuro-deficiency group. Due to this change in the results, our conclusions are now different from those of the preceding studies [3]. Retrospective analysis of a nationwide private insurance database was conducted in "Department of Orthopedic Surgery, University of Southern California, Los Angeles, CA, USA". The purpose of this study was to investigate any relationship between lumbar

degenerative disc disease, diabetes, obesity and smoking tobacco. The total number and prevalence of patients (per 10,000) within the database diagnosed with lumbar disc degenerative disease increased by 241.4% and 130.3%, respectively. The number of patients diagnosed with lumbar disc degenerative disease and smoking rose significantly more than patients diagnosed with lumbar disc degenerative disease and either diabetes or obesity ( $p < 0.05$ ). The number of patients diagnosed with lumbar disc degenerative disease, smoking and obesity rose significantly more than the number of patients diagnosed with lumbar disc degenerative disease and any other comorbidity alone or combination of comorbidities ( $p < 0.05$ ). The prevalence of heart disease was 23.2%. In our study, there is also a correlation between lumbar degenerative disease and smoking ( $p = 0.895$ ), diabetes mellitus ( $p = 0.006$ ) and vascular disease ( $p = 0.36$ ) [15]. An appropriate history of the current illness and physical examination may therefore help doctors determine the etiology of foot drop as well as the prognosis of improvement. A study published in "Journal of the Neurological Sciences" demonstrates the significance of grade of dorsiflexion paresis per manual motor testing as well as duration of symptoms. The same recommendation is offered by our research, namely that the patient's foot state be assessed together with their history and grade of muscular strength [8]. A Study by "Spine Lab, Department of Orthopedic Surgery, The First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou 310003, PR China" Foot drop resulting from degenerative lumbar diseases is a special presentation of a severe motor deficit. The most common lumbar conditions associated with foot drop are disc herniation and spinal stenosis. The pathology is typically located at L4/5 spinal level, although the involvement of L5/S1 and multiple levels is also common. Most patients will have an improvement to a certain degree during the postoperative period of 6 weeks to 6 months. Initial preoperative motor deficit status perhaps is the key factor associated with recovery, and as such, MMT of foot dorsiflexors should be carefully measured. Our study also shows that the disc herniation 108(39.7%) and lumbar stenosis 131(48.2) respectively both are most common lumbar degenerative disorder [20].

## CONCLUSIONS

The majority of participants (90,4%) fall into the excellent, decent, and fair categories and don't exhibit any foot drop. The prevalence of foot drop was precisely 9.55 percent. Patients who smoke, have vascular disease, are obese, or have had trauma are more likely to experience foot drop, which exacerbates the symptoms of adult lumbar degenerative changes. Additional research is required to examine additional risk factors for foot drop and to raise

awareness among those who may have lumbar degenerative condition.

## Conflicts of Interest

The authors declare no conflict of interest.

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