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Original Article

Profile of Lumbar Spinal Stenosis Patients at Dr. M. Djamil Central Public Hospital from 2018-2022

Inasa Faiza Akbar[1], Roni Eka Sahputra[2], Eka Fithra Elfi[3], Rizki Rahmadian[2], Dina Arfiani Rusjdi[4], Nelmi Silvia[5]

[1]Medical Student, Faculty of Medicine, Universitas Andalas, Padang, Indonesia
[2]Department of Orthopedic Surgery, Faculty of Medicine, Universitas Andalas, Padang, Indonesia
[3]Department of Cardiology, Faculty of Medicine, Universitas Andalas, Padang, Indonesia
[4]Department of Radiology, Faculty of Medicine, Universitas Andalas, Padang, Indonesia
[5]Department of Public Health and Community Medicine, Faculty of Medicine, Universitas Andalas, Padang, Indonesia

Correspondence should be addressed to Inasa Faiza Akbar, Medical Student, Faculty of Medicine, Universitas Andalas, Limau Manis, Pauh, Padang 25163, Indonesia, e-mail: inasafaiza191201@gmail.com

ABSTRACT

Background: Lumbar Spinal Stenosis (LSS) is a pathological condition characterized by narrowing of the spinal canal in the lower back. In Indonesia, comprehensive data on LSS is currently unavailable. This study aimed to determine the profile of LSS patients at Dr. M. Djamil Central Public Hospital.
Methods: This descriptive cross-sectional study utilized medical record data from 122 LSS patients at Dr. M. Djamil Central Public Hospital between 2018 and 2022, selected via consecutive sampling. Inclusion criteria included age over 18 years and a confirmed LSS diagnosis. Exclusion criteria included incomplete medical records, lack of MRI results, and follow-up visits without treatment. Univariate analysis was performed using SPSS 25.0 to describe patient characteristics, causative factors, symptoms, location of stenosis, and management type.
Results: In this study, 122 samples met the inclusion and exclusion criteria. LSS was mainly found in patients aged 60-69 years (33.6%) and in women (59%). Most LSS patients had obesity (Body Mass Index (BMI) category I, 32%). Many LSS patients were housewives (42.62%) and reported light work activity (63.1%). The most common cause of LSS was degenerative factors (59%). The main symptom experienced by LSS patients was lower back pain (94.3%), frequently accompanied by radicular pain (79.5%). The most common location of stenosis was L4-L5 (43.4%). Most LSS patients in this study were managed both conservatively and operatively (70.5%).
Conclusions: These findings contribute to a better understanding of LSS prevalence and distribution among patients. Further multicenter studies are needed to establish a comprehensive national LSS profile.

Keywords: Chronic disease; Degenerative; Low back pain; Lumbar spinal stenosis

INTRODUCTION

Approximately 90% of the population will experience low back pain at least once in their lifetime.[1] Nearly 14% of patients with low back pain have spinal stenosis.[2] It is estimated that more than 200,000 adults in the United States suffer from symptoms of spinal stenosis.[3] This represents approximately 1 in 1,000 people over 65 years old and about 5 in 1,000 people over 50 years old. The prevalence of this disease is projected to increase to 18 million within the next ten years.[4] Although the majority of individuals over 60 years of age have spinal stenosis, most remain asymptomatic. Therefore, determining the exact number of spinal stenosis cases is still challenging.[1]

Although no epidemiological data on spinal stenosis exists in Indonesia, several case reports from various cities have been documented. Initial data from the Orthopedic and Traumatology Polyclinic at Dr. M. Djamil Central Public Hospital revealed approximately

697 spinal stenosis cases from 2018 to 2022, with 418 classified as lumbar spinal stenosis (LSS).

Lumbar spinal stenosis is a pathological process in which the bone components, ligaments, and axial synovial components of the lower spine degenerate progressively, pressing on the nerve components and blood vessels in the spinal canal, and can affect the cauda equina.[5] The degenerative process in the lumbar spine is more progressive and often occurs due to repeated injuries. The lumbar area is vulnerable to injury because of its function in supporting the body, such as carrying body weight. LSS most often affects L4-L5, followed by L5-S1 and L3-L4.[6]

LSS causes root compression with symptoms of neurogenic claudication or radicular pain in the lower extremities that worsen when walking or standing.[2] Patients can also experience lower extremity pain while walking, difficulty walking, lower back pain, and lower extremity weakness. This condition reduces the quality of life and can result in progressive disability. Degenerative diseases that cause symptoms of spinal stenosis appear with age and have a significant negative impact globally.[1]

Therefore, LSS is a disease with a higher prevalence than other types of spinal stenosis and has a poor prognosis if not treated early. Moreover, in Indonesia, no data reveals the prevalence, age, gender, etiology, and clinical picture of LSS. This research aims to address this gap by investigating the profile of LSS patients at Dr. M. Djamil Central Public Hospital from 2018 to 2022. By providing a comprehensive understanding of LSS in this population, this study can help raise awareness of the condition and encourage early diagnosis and treatment. Ultimately, this could lead to improved quality of life for individuals with LSS.

MATERIAL AND METHODS

This descriptive cross-sectional study utilized medical record data from patients diagnosed with lumbar spinal stenosis at Dr. M. Djamil Central Public Hospital from 2018 to 2022. Ethical approval was obtained (LB.02.02/5.7/203/2023).

Study Population and Sampling

The study population included patients aged 18 years and older who were diagnosed with lumbar spinal stenosis in the Department of Orthopaedics and Traumatology at Dr. M. Djamil Central Public Hospital between 2018 and 2022.

Patients were excluded if they had incomplete medical records, including missing MRI results, or if they only underwent follow-up visits without receiving treatment. Additionally, patients with insufficient contact information were also excluded.

The sample size was determined using Isaac and Michael's theory, which indicated a minimum sample size of 122 patients. A consecutive sampling technique was used.

Data Analysis

Data were analyzed univariately using SPSS software version 25.0 (IBM Corporation, Armonk, NY, USA) to describe the frequency distribution of each variable studied. Frequency distribution tables were generated for age, gender, Body Mass Index (BMI), type of work, causative factors of LSS, clinical picture, location of stenosis, and type of management in patients with lumbar spinal stenosis at Dr. M. Djamil Central Public Hospital from 2018 to 2022.

RESULTS

Table 1 shows that the age group most affected by LSS is 60-69 years. The number of LSS patients increased steadily from the <40 years age group to the 60-69 years age group. However, after reaching the peak in the 60-69 year group, there was a decline in the number of patients in the ≥70 years age group. The average age of LSS patients in this study was 55.84 years (SD ± 13.2). Table 1 also indicates that LSS is more common in females, with a female-to-male ratio of 1.44:1. While the

Table 1. Age and gender of patients with lumbar spinal stenosis

Age	Frequency (%) n=122		Total
	Male	Female	
<40	6 (4.92)	6 (4.92)	12 (9.8)
40-49	7 (5,.73)	8 (6.56)	15 (12.3)
50-59	14 (11.48)	25 (20.49)	39 (32)
60-69	17 (13.93)	24 (19.67)	41 (33.6)
≥70	6 (4.92)	9 (7,38)	15 (2.3)
Mean ± SD		55.84 ± 13.2	
Total	50 (40,98)	72 (59,02)	122 (100)

Table 2. Distribution of BMI by gender in LSS patients

BMI	Frequency (%) n=122		Total
	Male	Female	
Underweight	6 (4.92)	4 (3.28)	10 (8.20)
Normal	15 (12.3)	19 (15.57)	34 (27.87)
Overweight	12 (9.84)	11 (9.02)	23 (18,86)
Obesity I	15 (12.3)	24 (19.67)	39 (31.97)
Obesity II	2 (1.64)	14 (11.48)	16 (13.11)
Mean ± SD	23.42 ± 3.83	25.77 ± 5.0	
Total	50 (40.98)	72 (59.02)	122 (100)

60-69 years age group had the highest number of male LSS patients, the peak age group for female patients was 50-59 years.

The average BMI of LSS patients in this study was 24.8 kg/m² (SD ± 4.68), with a predominance of obese individuals. Table 2 presents the frequency distribution of BMI categories by gender. Among female LSS patients, the most frequent BMI category was Obesity I. For male patients, Normal BMI and Obesity I were the most frequent categories, occurring with equal frequency. Male LSS patients had an average BMI of 23.42 kg/m² (SD ± 3.83), while the average BMI for females was 25.77 kg/m² (SD ± 5.0).

Many LSS sufferers had jobs with light work activities (63,1%), followed by heavy activity (23,8%) and moderate work activities (13,1%). In addition, LSS patients had the most types of work as housewives (42,62%).

Table 3 shows that the most common cause of LSS is degenerative factors (74.6%). Congenital and metabolic causes were not found in this study (0%). Neoplasms (2.5%) were the least common cause, followed by infectious (4.1%) and iatrogenic (4.1%) factors. Degenerative factors were the most common cause across all age groups, with the highest rate in the 60-69 year age group.

Table 4 shows that the most common primary complaint among LSS patients in this study was lower back pain (94.3%), followed by lower extremity weakness (3.3%). Table 5 presents the frequency of other accompanying complaints experienced by LSS patients, with radicular pain being the most common. It is worth noting that some patients experienced more than one accompanying complaint, but this did not affect the overall results.

Table 6 shows the location of stenosis in LSS patients. The most frequent location was L4-L5 (43.4%), followed by locations that cover many or multiple levels (29.5%), L3-L4 (12.3%), L5-S1 (11.5%), and L2-L3 (2.5%). The location least affected by stenosis

Table 3. Distribution of age and causative factors in lumbar spinal stenosis

Causative Factor	Frequency (%) n=122					Total
	Age in years					
	<40	40-49	50-59	60-69	≥70	
Infection	3 (2.46)	0 (0)	1 (0.82)	1 (0.82)	0 (0)	5 (4.1)
Degenerative	5 (4.10)	14 (11,5)	26 (21,31)	34 (27.87)	12 (9.8)	91 (74.6)
Iatrogenic	1 (0.82)	0 (0)	2 (1.64)	1 (0.82)	1 (0.82)	5 (4.1)
Trauma	2 (1.64)	1 (0.82)	8 (6.56)	5 (4.1)	2 (1.64)	18 (14.8)
Neoplasm	1 (0.82)	0 (0)	2 (1.64)	0 (0)	0 (0)	3 (2.5)
Idiopatic	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Congenital disease	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Metabolic disease	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	12 (9.84)	15 (12.3)	39 (31.97)	41 (33.61)	15 (12.3)	122 (100)

Table 4. Distribution of LSS patients based on main complaints perceived

Main Complaint	Frequency (%) n=122
Lower Back Pain	115 (94.3)
Lower Extremity Pain	3 (2.5)
Lower Extremity Weakness	4 (3.3)

Table 5. Percentage of accompanyingcomplaints experienced by LSS patients

Accompanying complaints	Percentage (%)
Lower back pain	4.1
Intermittent claudication	33.6
Lower extremity pain	16.4
Lower extremity weakness	22.95
Exacerbation on prolonged standing	59.8
Complaints improve when bending forward	41
Other	
• Radicular pain	79.5
• Numbness in the extremities	21.3
• Tingling in the extremities	9.8

Table 6. Distribution of stenosis location in LSS patients

Locations of stenosis	Frequency (%) n=122
L1-L2	1 (0.8)
L2-L3	3 (2.5)
L3-L4	15 (12.3)
L4-L5	53 (43.4)
L5-S1	14 (11.5)
Multiple	36 (29.5)

in this study was L1-L2 (0.8%).

This study found that 29.5% of patients (36 patients) were treated with conservative treatment alone, while 70.5% (86 patients) were treated with a combination of conservative and operative treatment. Therefore, the most common treatment approach for LSS patients in this study was a combination of conservative and operative treatment.

DISCUSSION

Frequency Distribution of LSS Patients Based on Age and Gender

In this study, most LSS patients had an age range of 60-69 years, with a percentage of 33.6%. There is an increase in the percentage of sufferers from the age group <40 years to 60-69 years and decreases in the age group ≥70 years. Research conducted by Machino et al. in 2022 regarding the influence of age on intervertebral disc degeneration found that the population aged 40-49 years to 60 experienced a percentage increase then decreased at the age of ≥70 years.[7] It can be related to the theory that elderly individuals are more susceptible to experiencing LSS because LSS is closely related to the aging process of the spine. Spinal stenosis generally becomes clearer as age increases. Several studies state that the factors that can cause degenerative diseases are genetics, gender, and several environmental influences such as work. Sinai et al. showed a significant relationship between increasing age and the process of spinal lists until the 6th decade of life, but it decreased after the 6th decade. This study also reported a similar relationship between increasing age and the incidence of stenosis. According to Emamhadi et al. showed a higher prevalence of spinal stenosis in the 5th decade of life.[8]

Age-related neuropsychological changes in pain processing can reduce awareness and reporting of pain in older adults, potentially leading to undiagnosed health issues and injuries. The decrease in LSS incidence in the ≥70 years age group in this study may be due to reduced mobility in this age group, resulting in fewer hospital visits and diagnoses. Furthermore, according to Statistics Indonesia (BPS), the life expectancy in West Sumatra is 67.99 years for men and 71.89 years for women.[9] This relatively low life expectancy in West Sumatra may contribute to the decline in the population aged ≥70 years.

In this study, female LSS patients outnumbered males, with a female percentage of 59.02% and a female-to-male ratio of 1.44:1. This contrasts with the findings of Mashinchi et al., where males were more prevalent (35.4% female).[8] Several factors may contribute to the higher prevalence of LSS in women. Research by Peteler et al. suggests that pain perception and psychological influences on quality of life play a role.[10] Hormonal factors can also accelerate spinal degeneration in women. Additionally, osteoporosis is more prevalent in older women compared to men, increasing their susceptibility to LSS.[10] Middle-aged and older women are particularly vulnerable to osteoporosis due to increased bone resorption during perimenopause.[10] The higher rate of LSS in women may also be attributed to their increased awareness of preventive healthcare and greater likelihood of undergoing regular check-ups. Data indicate that women generally have a longer life expectancy than men, potentially leading to more frequent medical evaluations throughout their lives. Furthermore, women tend to be more aware of their health and may be more likely to seek medical attention when they experience health concerns.

Frequency Distribution of LSS Patients Based on BMI

The average BMI of LSS patients in this study was 24.8 kg/m² (SD ± 4.68). This is similar to the average BMI of 23.1 kg/m² (SD ± 2.8) reported by Ono et al.[11] However, Taneja et al. found a significantly higher average BMI of 28.68 kg/m² in their study of LSS patients.[12] In the present study, the average BMI of female patients (25.77 kg/m², SD ± 5.0) was higher than that of male patients (23.42 kg/m², SD ± 3.83).

Obesity, particularly the distribution of fat across the trunk, is closely associated with biomechanical changes that can damage the spine and contribute to various spinal diseases. These include intervertebral disc degeneration, spinal stenosis, decreased disc height, disc herniation, spinal ligament hypertrophy, osteoarthritis (OA), and increased compressive forces on the intervertebral discs. Lucha-López et al. found that female

gender and obesity were associated with a higher risk of low back pain, suggesting that a combination of these factors may increase the likelihood of experiencing this condition.[13] The theoretical background explaining the relationship between low back pain and BMI includes mechanical factors, such as excessive load on the spine caused by high body weight, and inflammatory factors, such as the relationship between the pro-inflammatory environment caused by adipose tissue and intervertebral disc degeneration. Thus, structural changes may play a role in back pain as a manifestation of LSS.[13] Individuals with higher levels of obesity, such as those in obesity category II, may face challenges with mobility that can limit their ability to access healthcare, potentially resulting in underdiagnosis of LSS. Additionally, some individuals with obesity may experience anxiety or fear related to their body image and potential negative experiences in healthcare settings, which can be a barrier to seeking medical attention. This fear may stem from concerns about judgment or stigma related to their weight, or from previous negative encounters with healthcare providers.

Frequency Distribution of LSS Patients Based on Type of Work

The most common work activity category among LSS patients in this study was "light activity" (63.1%), as defined by Steeves et al. This category encompasses a variety of work and leisure time physical activities that can influence health outcomes. Notably, the light activity category is associated with higher levels of leisure time physical activity. Lucha-López et al. found that the most frequent types of physical activity at work associated with LSS symptoms were standing all day (44.1%) and sitting all day (38.5%), both of which fall under the "light activity" category.[13]

The second most common work activity category was "heavy activity" (23.8%). Jobs involving heavy physical activity can contribute to back pain and degenerative changes in the lumbar spine due to occupational exposures such as lifting heavy objects and whole-body vibration, as well as exposures outside of work. Given the degenerative nature of LSS, heavy manual work may be associated with a higher risk or severity of the condition.

The most frequent occupation among LSS patients was "housewife" (42.62%). This finding may explain the high prevalence of the "light activity" category in this study. Women often have greater responsibilities for household tasks and may spend more time engaged in these activities compared to men. This can lead to increased exposure to physical risk factors such as awkward static postures. Maintaining non-ergonomic body postures, including repetitive or static postures for prolonged periods, can cause pain, fatigue, and injury. If women engage in physically demanding work, it can lead to fatigue, frustration, and other psychological issues.

The high percentage of housewives among LSS patients may also be related to healthcare-seeking behaviors. Housewives often play a central role in their households, making it difficult for them to be replaced if they become ill. This may lead to greater awareness of their health and a higher likelihood of seeking medical attention. In contrast, individuals in occupations like farming, where their work is difficult to delegate, may be more likely to delay seeking healthcare when experiencing symptoms. This could contribute to the lower prevalence of LSS among farmers compared to housewives in this study.

Frequency Distribution of LSS Patients Based on Causal Factors

The most common cause of LSS in this study was degenerative factors, which can be associated with a history of various degenerative spinal diseases such as spondylolisthesis, herniated nucleus pulposus (HNP), spondyloarthritis, osteoarthritis, and osteoporosis. Ishimoto et al. found that the prevalence of symptomatic LSS is significantly higher in patients with spondylolisthesis compared to those without.[14] Sobczyk et al. reported

that osteoarthritis in the facet joints of the spine can contribute to spinal canal narrowing due to joint hypertrophy, suggesting a potential role for genetic predisposition to OA in the development of spinal stenosis.[15]

Degenerative factors were the most common cause of LSS across all age groups (<40 years to ≥70 years), with the highest prevalence in the 60-69 year age group. In contrast, Ishimoto et al. found that the 70-79 year age group had a higher prevalence of LSS with spondylolisthesis.[14] This discrepancy may be attributed to the fact that degenerative changes in the spine, including osteophyte formation, ligament thickening, and intervertebral disc degeneration, often begin after the age of 50.

In the <40 years age group in this study, infection was the second most common cause of LSS. Spinal infections can lead to a destructive process in the lumbar vertebrae, resulting in compression of the thecal sac and severe spinal cord stenosis. Up to 50% of patients with tuberculous spondylitis experience spinal lesions, and 10-45% develop neurological deficits.[16]

Frequency Distribution of LSS Patients Based on Clinical Features

This study examined clinical features based on primary complaints and accompanying complaints. The most common primary complaint among LSS patients was lower back pain (94.3%). This finding aligns with Ishimoto et al., who also reported that the majority of patients experienced lower back pain.[14] In contrast, Dobkin et al. found that 17 out of 19 patients experienced lower extremity pain as their primary complaint.[17] These clinical symptoms arise from a combination of neurovascular mechanisms, nerve root excitation, and mechanical compression of the spinal canal. These mechanisms can occur concurrently, so patients often present with both lower back pain and radicular pain or neurogenic claudication.[18]

The most common accompanying complaint in this study was radicular pain (79.5%), which is often associated with neurogenic claudication. In fact, radicular pain is one of the ways patients describe the pain associated with neurogenic claudication. Si Young Park et al. reported different findings, with 9% of patients experiencing only radicular pain, 13% experiencing only neurogenic claudication, and 67% experiencing both symptoms simultaneously.[18] This difference in the prevalence of radicular pain and neurogenic claudication may be attributed to variations in study populations, diagnostic criteria, and methods of assessing symptoms.

Frequency Distribution of LSS Patients Based on Stenosis Location

The most common location of stenosis in LSS patients in this study was L4-L5 (43.4%). This finding is consistent with research by Si Young Park et al., which reported that L4-L5 was the most frequently involved level, with a prevalence of 45%.[18] In individuals over 40 years of age, the L4-L5 level is more susceptible to disc degeneration. With age, there is a gradual degeneration of the intervertebral discs, which can lead to disc herniation and degenerative disc disease. Degenerative spondylolisthesis, a common cause of LSS, also has a high prevalence at the L4-L5 level, occurring approximately 6 to 9 times more frequently at this level compared to other levels. Additionally, Qin et al. found that pressure on the superior articular processes of L3 and L4 is significantly higher in degenerated intervertebral discs compared to normal discs.[19] This increased pressure can occur when the nucleus pulposus of the intervertebral disc degenerates, leading to a narrowing of the intervertebral space.

Frequency Distribution of LSS Patients Based on Management

Currently, patients with LSS have two main treatment options: conservative (non-operative) and operative (surgical). Given the invasive nature of surgery, patients often prioritize conservative treatment to avoid the associated risks. However, the effectiveness of conservative treatment for LSS can vary considerably among individuals. While some patients may experience significant

improvement with conservative measures, others may ultimately require surgical intervention if conservative treatment fails. Delaying necessary surgical treatment can impact the timeliness and efficacy of treatment.[20]

Another factor to consider, especially in older adults with LSS, is polypharmacy (the use of multiple medications). The prevalence of polypharmacy is high in elderly LSS patients for whom surgery is indicated. Nagai et al. found that surgical treatment for LSS was effective in reducing polypharmacy in this population, and that improvements in psychological well-being were associated with a reduction in the number of prescribed medications after surgery.[11]

This study has several limitations. First, as a retrospective study utilizing secondary data from medical records, detailed information such as physical activity outside of work and specific causative factors beyond the documented medical history was not available. Second, some medical records had incomplete data, particularly regarding radiological results and occupation, leading to the exclusion of those records from the analysis. Finally, the discussion of factors influencing the profile of LSS patients remains limited due to the restricted scope of this study. Further research is needed to provide a more comprehensive analysis of the profile of LSS patients at Dr. M. Djamil Central Public Hospital.

CONCLUSION

This study investigated the profile of lumbar spinal stenosis patients at Dr. M. Djamil Central Public Hospital from 2018 to 2022. The findings indicate that the largest age group affected by LSS was 60-69 years, with a decreasing trend observed after this peak. LSS was more prevalent in females. The most common BMI category among LSS patients was Obesity I. The majority of patients engaged in light work activity, with "housewife" being the most common occupation. Degenerative factors were the most frequent cause of LSS. Lower back pain was the most common primary complaint, and radicular pain was the most frequent accompanying complaint. The most common location of stenosis was L4-L5. Most patients in this study received a combination of conservative and operative management. These findings contribute to a better understanding of the prevalence and distribution of LSS. Further multicenter research is needed to establish a more comprehensive national profile of LSS.

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