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One Year Longitudinal Conservative Physiotherapy in Geriatric Lumbar Spinal Stenosis – An Evidenced Research

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Abstract

Geriatric subjects were commonly shown to develop low back ache from multiple factors including Trauma, Falls, Degenerative changes; These can over period of time leads to restrictions of spinal, Leg mobility resulting in pain, difficulting in walking and self-care. Lumbar canal stenosis, one among the common geriatric degenerative condition limiting subjects living standard with higher rate of dependency. Complications, Cost, Comorbid conditions, Obesity, Depression, Family support can further be challenging outcome of spinal surgical management of these subjects. This research aiming to analyses the efficacy of Non-Pharmacological means using patient centric physiotherapy for an year of among subjects with Lumbar canal stenosis with mean age of 72 years (n=3). Pain and functional activities were measured using NPRS and ODI. Clinical prognosis and statistical analysis have shown greater reduction in pain and better functional activities of these subjects. Findings of this Research can be validated with larger sample, whereas lesser research conservative physiotherapy care of these subjects makes this study with a newer encouraging means.

Keywords: Disability, Hypertensive, Lumbar Spinal Stenosis, Spinal

Introduction

Lumbar spinal stenosis (LSS) where narrowing of the central spinal canal, lateral recess or foramen compression leads to compression of Neurovascular structures resulting in back and leg pain, disability with lowering of health related QOL (Battie et al 2012). Central canal stenosis affecting middle and elders above 65 years as most common indicator for spinal surgery with incidence of 5/1,00,000 (MA Lancia et al 2014). Thorough physical examination, Spinal stenosis among adults above 60 years remains the most common diagnosis associated with spinal surgery as noted by Goren et al 2010; whereas sing et al 2016 have from 100 subjects aged 20-70 years using CT scan have noted LSS with maximum prevalence among middle aged men and more among female at L5 level with highest narrowing. History and supportive neuro imaging can help early

diagnosis and due treatment as female having LSS to have, Spinal cord compression, with Neurogenic sign influenced by hormones and weight bearing (Ee Rakhawy et al 2010) with highest prevalence of LSS in L5 level among Indian female to be caused by ostrogen an degeneration process of the spine among 50 female 84% had symptomatic LSS using MRI among Indian population as reported by Ahmed et al 2011. Based on recommendation by WFNSSC, 3 months conservative should provide clinical condition changes; LSS most common reason for spinal surgery for subjects > 65 years in U.S with 47.2% among 60-69 years; increasing with age (Kalichman et al 2009). (WU 2024) - > 65 years important indication for spinal surgery.

Table 1: Risk Factors

1	Sykin et al 2025	Occupational risk factors with heavy physical burden at work, Psychological factors with duration of work.
2	Jihyun Ru et al 2025	Long term and heavy smoking, a risk factor
3	T.Tanaka et al 2025	Retrospective analysis 100 LSCS using MRI, Myelogram to show posterior slippage in extension as independent risk factor.
4	Co Bretal et al 2016	37 Pre operative for LSS with smoking, Hypertensive, Diabetes, Sedantry life style as risk factor for poor post operative outcome.
5	WU et al 2017	Ageing as a risk factor between 60-69 years 19-47%
6	Epstein 2012	Obesity to increase the risk of post operative infection and poor wound healing in spinal surgery
7	Andersen et al 2001	Smoking as a predictor for negative outcome in Lumbar spinal fusion and patient dissatisfaction.
8	Aalto et al 2006	Depression, increased cardio vascular risk, scoliosis, Age, Gender as predictors for post LSCS outcome
9	Tata hino maeda et al 2018	968 subjects of born gender in Japan using X-ray, HbA1C, Ankle brachial Index found Diabetes and low ABI to be a risk for LSS
10	Sunil Munakomi et al 2024	Degenerative spondylosis, Chronic wear and tear Trauma, most significant risk factors.
11	Binder et al 2002	LSS may be secondary to Achondroplasia, Ankylosing spondylitis, Degenerative spondylolisthesis.

As shown in the above table of evidence on risk factors for Lumbar spinal stenosis which includes (Congenital) Achondroplasia, Chronic wear and Tear, Trauma, degenerative spondylosis, Spondylolisthesis to be most common factors. However, smoking, Occupations with heavy physical work load handling, increased age (60-69 years) to predispose for developing Lumbar spinal stenosis. Cornorbidities like hypertension, Diabetes, Sedantry life style, Scoliosis, Depression, Low Ankle brachial index, Female gender with risk factors for poor outcome following surgical management of Lumbar canal stenosis.

Table 2: Prevalence of Lumbar Canal Stenosis

1	Jensen et al 2020	In a systematic review on prevalence of LSS from 41 papers have reported 11-39%
2	James J young 2020	Insisted on multimorbic prevalence of degenerative LSS, with hip/knee Osteo Arthritis with 0-54%
3	Young JJ et al 2023	From 6, 541 Denmark subjects with OA knee, reported comorbid LSS, symptoms with 50%; Early identification can inform an clinical decisions.
4	Alexander Abdon et al 2025	Compression of Neuro vascular structures LSS can lead to claudication, Weakness of lower extremity, Paresthesia and functional activities
5	Rawindra et al 2018	Globally 103 million to be affected with LSS
6	Amendolia c et al 2016	With 2,00,000 people in US affected with LSS and leading cause of spinal surgery above >65 years
7	Kalichman et al 2009	Acquired LSS to be more prevalent at 60-69 years
8	Xu et al 2023	Identified 79 genes associated with LSS
9	Shi et al 2024	Facet joint Arthritis accelerating degenerative changes to LSS
10	Kalichman et al 2009	Among 191 subjects with LSS 2.6 patients to have congenital implications
11	Schroeder et al 2016	Acquired L spinal stenosis present in sixth or seventh decade of life with back pain, Sciatic, Weakness usually bilateral from 68 patients 93% had pain, 63% had numbness.
12	Suri et al 2010	Claudication's seen among elderly with LSS at 82% where flexion giving relief and extension increased pain and relief with sitting
13	Munakami et al 2016	Recorded extensor digit rum brevis weakness 60% unilaterally, 30% Bilaterally used to diagnose LSS clinically.

An increasing prevalence of Lumbar canal stenosis were globally recorded with increasing age, Genetic predisposition, but above 60 years common clinically condition setting diagnosed and treated. While cormid degenerative hip and knee osteo Arthrithritis, Neuro vascular claudication, Low back Ache, Pediculopathy, Extensor carpi brevis weakness, Bilateral leg pain, were recorded needs further due evaluation and treatment.

Spinal stenosis among adults above 60 years remains the most common diagnosis associated with spinal surgery as noted by Goren et al 2010; whereas sing et al 2016 have from 100 subjects aged 20-70 years using CTS can have noted LSS with maximum prevalence among middle aged men and more among female at L5 level with highest harrowing.

Central canal stenosis affecting middle and elders above 65 years, as most common indicator for spinal surgery with incidence of 5/1,00,000 (Malancia et al 2014). Thorough physical examination, history and supportive neuro imaging can help to early diagnosis and due treatment as female having LSS to have candal, Spinal cord compression, with Neurogenic sign influenced by hormones and weight bearing (El Rakhawy et al 2010) with highest prevalence of LSS in L5 level among

Indian female to be caused by ostrogen on degeneration process of the spine among 50 female 84% had symptomatic LSS using MRI among Indian population as reported by Ahmed et al 2011.

Table 3: Complications Post LCSS

1	Dekutoski et al 2010	Rate lower than 10%
2	Co Bretas et al 2016	Death 2.7% due to pulmonary thrombo embolism
3	Takashi et al 2013	41 Diabetic patients post lumbar spine surgery with poor outcome than non Diabetic
4	Kowtson et al 2013	From 2633 swedish post LSS surgery subjects who are obese to use Analgesics, increased LBA, Leg pain and low QoL in two years followup
5	Andersen et al 2001	Smoking doubles the risk of Non union in Arthrodesis
6	Airakinsen et al 2006	Spinal failure rates from 5-0% patient satisfaction over surgery, a key component
7	Sunil munakomi et al 2024	Chronic LBA, Leg pain limited exercise tolerance, Muscle Atrophy canda equira syndrome, ↓ QOL.
8	VOAN et al 2005	LBA, Postural defects, ↓Range of hip, Muscle tightness.
9	Lin SI et al 2005	Sensory deficit motor weakness, Pathological reflexes.
10	Iversen et al 2001	Restricted walking, Exercise tolerance, Function QOL.

As displayed in the table of evidence on complications with Lumbar spinal stenosis which includes Low back pain, Pain down the legs, Atrophy of muscle, Postural defects, decreased range of motion of hip, Knee, Feet and spine, Motor weakness, Sensory deficit, Poor exercise tolerance, Difficulty in walking, decreased function, low quality of living, Cowdaequine syndrome.

Along with complications following surgical management involving failure of spinal surgery pulmonary thromboembolism, Death patient dissatisfaction but outcome of post-operative Lumbar spinal stenosis can be complicated with patients having diabetes, Obese and smokers as recorded with evidenced literature.

Physical Evaluation, Investigation In The Diagnosis of LSS:

- Jeffrey katz et al 2022 on physical examination and history in LSS Diagnosis, where 93 patients with lower extremity pain, Age, Absence of pain in sitting, Physical examination with wide based Gait, Abnormal Romberg sign, Thigh pain following 30 second lumbar extension and neuro muscular deficit were found useful in the diagnosis of LSS among elders, with 88% of those LSS using imaging studies similar to history and physical examination. LSS presents with axial low back pain, Radiculopathy aggravated by ambulation and Lumbar extension. These are bilateral but usually algometric, as Neurogenic claudication, an important symptom in most patients with Low back pain, numbness and tingling sensation, while 43% experiencing motor weakness. Further walking up the stair case among these subjects were easier than downstairs as the spine is forward flexed when climbing stairs. Moderate LSS subjects were shown to sit without pain for 50 minutes and walk for 50 feet, where severe cases present with motor weakness, Gait impairment and postural sway (Ujjago et al 2023)

wasting of Bilateral extensor digitorum brevis was shown to be clinical marker of LSS (Munakomi et al 2016) straight leg raising test, checking for Pedal pulse, to rule out vascular claudication be carried out.

- Neuro imaging to be used when evaluating Low back pain in the presence of red flag symptoms and Lumbo sacral radiculopathy or spinal stenosis; Plain, X-ray, CT, MRI to be used to confirm Lumbar canal stenosis. Further Electro myography, Nerve conduction studies, Gait assessment to be used in the assessment of functional status of LSS subjects (Nuesch et al 2023.
- As an increased prevalence of Lumbar canal stenosis every adult with low back ache, Radiculopathy symptoms, Straight leg raising, Pedal pulse, aggravating pain on spinal movements should be duly evaluated, if any deviation from normality, at once be referred for Radiological investigation along with orthopedic referral for further differential diagnosis and due medical management as infrared from above discussed evidenced literature. Early screening of subjects likely to have / develop lumbar canal stenosis to be evaluated and treated with due medical, physical therapy can to a larger extent prevent these subjects from undergoing decompressive surgery which can be cost effective, complicate living standard post operatively. At the same time identification of subjects who can benefit from surgical intervention to be judiciary carried out.

Non Pharmacological interventions with physiotherapy modalities were shown to be effective in the conservative management of Lumbar canal stenosis. Interferential therapy, Manual therapy, strengthening exercises, Stabilization exercises, Stretching, Balance training, Aerobic exercises were shown to be effective in improving functional activities while decreasing pain. Patient education, Home exercises, Cognitive behavioral therapy, Flexibility exercises, Cycling further capacity and due self confidence among Lumbar canal stenosis subject. Further treatment of comorbid conditions like Hip and Knee osteoarthritis, Obesity, depression were proven to be effective in improving living style of these subjects. But many follow ups have shown 1/3rd of Lumbar canal stenosis to improve with pain and function remaining 50% with symptoms with conservative physiotherapy outcome. Hence long term multidisciplinary follow up, a needy among Lumbar canal stenosis to prevent or postpone them from undergoing spinal surgical intervention.

Lumbar Canal stenosis as noted from scientific evidence above a common clinical indications of subjects above 60 years. Any spinal surgical intervention likely to have complications and cost high further family support, Patients physical, Psychological conditions, Comorbid status can influence on post-operative outcome. Conservative non-pharmacological interventions including patient specific evidenced physiotherapy, Lifestyle modifications among Geriatric subjects with Lumbar canal stenosis remains challenging, less researched and under reported. Hence this research where three Geriatric subjects n=3 with mean age of 72 years male Diagnosed with Lumbar canal stenosis were treated for an year their pain and functional activities were found to be positive and relevant factors on follow up, Rehabilitation were discussed using scientific evidence. Findings of this Research can form foundation for RCT for greater levels of evidence, can be considered in to integration in forming protocols and guidelines in the conservative management of Geriatric

subjects with LSS an increasing clinical condition affecting Geriatric Healthcare.

Aims and Objectives: of this Research were to evaluate conservative problem related physiotherapy among geriatric subjects with LSS on pain and functional activities for an year.

Materials and Methodology

- Three subject with mean age of 7 years Endomorph type II diabetic subjects and hypertensive on medication vegetarian with sedentary lifestyle have complained of severe low back pain with left Radiculopathy subsequently orthopedic surgeon has adviced lumbar discectomy and fusion, NMRI of Lumbar spine dated 14/02/2024 has revealed multi-level Lumbar spondylosis with compression bilateral nerve roots at L1-L2, L2-L3 and L4-L5 with central canal stenosis.
- Mean Waist circumference – 100cm
- ROM – Spine, Peripheral joints – Painful restricted
- Gait – Ambulant for short distance with Antalgic gait
- Balance – Moderate with support in standing
- Transfer activities – Independent
- Pain -> Increasing on walking and long hours of sitting mean NPRS – 8/10.
- Lumbar Lordosis – Obliterated
- Upper extremities, Cervical spine end range restricted
- Thoracic Kyphosis, Hip Abduction, restricted Right < Left
- Bilateral hip flexors, Hamstring, Tendoachiles tightness
- Cognitively good, Widower depends for psychological support from family but financially independence.
- Functional Problems: Unable to walk more than 10 steps, develops severe Pain in low back and left leg.
- Consent were obtained from each participant. Institutional ethical committee approval was obtained.

They were treated with core strengthening exercises, Passive stretching, Posture correction in lying, Sitting and standing postures. Thera band with 13 LBS and Physio ball 55 cms were used. Exercises were progressed with intensity repetition and starting positions. Each session lasted with 50-70% maximal heart rate ranging from 25-30 minutes with weekly twice frequency from 01.11.2024 to 30.11.2025. Each subjects NPRS, ODI, Zurich claudication question were used prior to starting the research and after a year. Obtained details were recorded, Tabulated and analyzed using statistical evidences.

Results

Table 4: Table of results of Pre and Post NPRS, ODI, Zurich clarification Questionnaire

	NPRS	ODI	Zurich Claudication Questionnaire
Pre	7	84	82
Post	2	34	29
SD	2.89	28.87	30.60
Se	1.67	16.67	17.67
P	2.90	2.99	3.00
t	<.05	<.05	<.05

NPRS:

Subjective pain rating scale ranging from 0-10.

ODI – Oswestry Disability score functional subjective rating on 10 items on six-point scale validated by Zurich clarification Questionnaire a subjective rating Questionnaire on 12 items on a 0-5 scale.

Discussion

Table 5: Conservative Physiotherapy in LLS

1	Tanna et al 2025	16 weeks with manual therapy Interferential, Targeted exercises, Strength training improved functional status in LCS
2	Iverson et al 2010	Therapeutic exercise and manual therapy decrease pain and improves function in LS stenosis
3	Kuck et al 2005	Among 6 Lumbar canal stenosis with mean age of 63 years used Lumbar stabilization in water thrice 9 week for 6 weeks with decreased pain and improved function with RMD Questionnaire
4	Therapy et al 2006	Among 57 LSS subjects with mean age of 65 years used amnual therapy thrice a week in 3 weeks found with improved pain and function with RMD Questionnaire
5	Whitman et al 2003	Among three subjects with mean age of 73 years for 10 sessions using strengthening exercises and walking recorded using Oswestry disability scale with 66 to 95%, Pain and function improved.
6	Fritz et al 2006	Among 2 subjects with mean age of 72 years used flexibility, Strengthening walking for 6 weeks thrice a week have shown improved pain, ROM, Ambulation
7	Greenman et al 2006	Among 15 LSS subject with a mean age of 70 years used balance, Flexibility, Strengthening, Aerobic exercises 4 week with improved pain relief, walking
8	J J young et al 2022	Among 6,813 subjects with LSS having comorbid symptoms for knee/Hip OA were treated with patient education and exercises, recorded decreased pain, improved function and living quality in hip, knee along with Lumbar 85 symptoms
9	Sean MC Auliffe et al 2025	In a S.R from non-surgically treated LSS clinical course in long term from 18 studies for 12 months on pain and disability with 1/3rd reduction and little further improvement from 1-5 years.
10	Carlo Amendolia et al 2022	From a systematic review of non-operative treatment for LSS with neurogenic claudication from 23 studies, concludes manual therapy and exercises provides short term improvement in symptoms and function, Patient, Education, Cognitive behavioral therapy, Home exercises were shown to be effective as multi model approach for short term benefit, a moderate quality evidence were recorded.
11	Burgtaller et al 2020	In a multi-center study on degenerative LSS on long term results with non-surgical treatment with non-surgical treatment includes 601 patients for 36 months follow up with

		50% subjects improved with symptoms and function with level 3 evidence.
12	C Comer et al 2024	From 13 trials on exercises for LSS identified supervised exercises, flexion exercises, Balance, Stretches, Strengthening fitness exercises, Cycling, Psychologically informed approaches to be effective.

Lumbar stabilization, Manual therapy, Balance, Patient education, Flexibility exercises and stretching as shown in the above Table with evidence formed the line of treatment for the research subjects in this study.

Sudhir Diwan et al 2019 in an algorithmic approach to treating lumbar Canal stenosis with evidenced means advocated conservative treatment comprising physiotherapy, medication, Education, Exercises followed by epidural steroid injections, this research subject was treated with exercises and patient education with good results, Similar to measurements of physiotherapy for an year.

Kneiner et al 2013 on the evidence based clinical guidelines on the diagnosis and treatment of LSS with a goal to optimize effective treatment and functional recovery debilitating symptoms, natural history of mild to moderate LSS may be favorable for 33-50% of patients. However, the symptomatic pain the legs and back can lead to impaired Ambulation and other disabilities (Lurie and Tom kins 2016). Physical therapy thrice a week for 4 -6 weeks for LSS patients in a five year cost analysis could be highly unfavorable with minimal improvement in pain and functional disability after maximal non operative therapies as pointed by owoicho Adogwa et al 2019.

Non pharmacological interventions with patient specific physiotherapy, remains a conservative means with no potential side effects, among three Geriatric subjects for an year were shown to be effective significantly an improving pain, functioning abilities as displayed in the Table of Results but needs further follow up to sustain the clinical and functional progress, as stated by kneier et al 2013, moderate positive prognosis achieved in this research > 50% whereas the study subjects complains of low back pain and postural changes with an increasing level of physical activities and their daily routine. Further cost effectiveness on continuing physiotherapy in order to postpone spinal surgical interventions can be challenging viewing of > 72 years of the subjects. An increasing age, Ability to continue Home exercises, Regular walking, Adherence to physiotherapy, Psychological well-being, Family support financial constraint, Comorbid status such as obesity, Diabetes were huge challenges to maintain this one year of functional betterment of this research subjects in future.

Machado 2016 on surgical management from 24 RCTS with paucity of evidence using decompression, fusion, inter spinous spacers. Jarret slater et al 2015 in a SR on exercises on perceived pain and disability have recorded exercises to be considered as first line intervention, with reduced complications and cost compared to invasive options.

As evidenced by above scientific literature that with post spinal surgical complications were not highly evidenced, conservative therapeutic approaches to be considered among LSS subjects, as in support of this research, with three geriatric subjects treated for an year of evidenced physiotherapy have benefited from not undergoing surgery with related cost and complications a key outcome of this research findings in favor of these subjects.

Lind back et al 2018 – on patient perceptions/experiences 18 pre Bio psychosocial to be addresses. Further from a retrospective study of LSS patients treated with conservative physiotherapy, Clinical outcomes depends on the number of sessions with twice a week to be effective than once a week using NRS, JOA Back pain evaluation Q and Zurich claudication Questionnaire Carlo Ammendolia et al 2022 in a systematic review of Non operative LSS with Neurogenic claudication with multi modal approach including manual therapy, Patient education to be effective. Christine Camer et al 2024 in a systematic review on exercise treatment for LSS with supervised flexion based exercises, Stretching, Cycling, Strengthening with optimizing exercise intervention for subjects with LSS. Christy Tomkins et al 2010 have recorded from 74 subjects above 50 years having LSS, 59% receiving physiotherapy treatment with massage, Flexibility strengthening exercises, Heat/Ice stabilization, Joint mobilization, where Julie Whitman et al 2006, in a six weeks RCT among 58 LSS subjects have shown manual therapy with body weight supported treadmill walking than Lumbar flexion and tread mill walking in improving NPRS, Oswestry functional scale. v RCT among 43 patients with LSS comparing supervised versus home exercises for 6 weeks have established supervised exercises including manual therapy individualized stretching, Strengthening, cycling to be more effective on pain and functional betterment.

With these evidences in support of physiotherapy interventions used among LSS subjects in this research including twice a week session, multimodal therapy with resisted exercises using Thera band, Posture correction, Stretching, strengthening flexibility exercises which were gradually progressed towards functional activities and regular walking which have substantially decreased their pain, walking ability and ability and ability to take care of themselves as evidenced by Table of results.

Zaina 2016 surgical verses non-surgical in SR of 5 RCTS with 643 participants with surgical groups with 10-24% where as conservative treatment with no side effects. Luciana Gazzi macedo 2013 from a systematic review, among subjects with degenerative lumbar canal stenosis surgery was shown to be effective than physiotherapy for long term results. Further associated comorbid conditions like age, Hypertension, Diabetes among LSS subjects needs more care and complicate spinal surgical outcomes.

Luciana Gazzi macedo 2013 from a systematic review, among subjects with degenerative Lumbar canal stenosis surgery was shown to be effective than physiotherapy for long term results on pain and disability Lumbar spinal stenosis (LSS) where narrowing of the central spinal canal, lateral recess or foramen compression leads to compression of Neurovascular structures resulting in back and leg pain, disability with lowering of health related to QOL (Battie et al 2012). Further associated comorbid conditions like age, Hypertension, Diabetes among LSS subjects needs more care and complicate spinal surgical outcomes.

Conservative evidenced physiotherapy on LSS showing adequate betterment on pain, function, Walking, Lesser symptoms, Greater confidence among research subjects, high quality evidence are highly needed to substantiate findings of this study outcome as supported by systematic review by slan et al 2025.

Slan MC Auliffe et al 2025 from a systematic review of non-surgically treated subjects with LSS on long term clinical course with reduction in pain and disability in first year, but needs high quality evidences. Samantha

Jacobi et al 2021 in a systematic review on conservative physiotherapy in patients with Degenerative LSS recorded Manual therapy with supervised exercises in improving short term benefit on pain, Walking capacity Masakazer mine tama et al 2019.

These research subjects as above mentioned literature were above 70 years and diabetic, the expected post-operative Care, Cost, Complications, Hospital stay, family support, Psychological status can be highly questionable and risky, Hence forth this research where subjects getting treated with conservative evidenced physiotherapy were highlighted for above said benefits in terms of cost, Complications with adequate clinical and functional betterment achieved in this one year of therapy, but needs to be continued.

Conclusion

Geriatric subjects with Lumbar canal stenosis for an year of therapy with non-pharmacological interventions using physiotherapy were shown to benefit in terms of pain, Functional activities and walking as inferred from this Research. However needs to be validated with larger sample size and longer duration follow up on maintain these positive prognostic findings, but these outcomes can form foundation on preventing these subjects from undergoing spinal surgeries which were cost effective with zero complications. The author has conceived the idea has evaluated and treated using physiotherapy with due evidence, written the manuscript and analyzed here using literature declares no conflict of interest.

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