



EFFECT OF SPINAL STABILIZATION EXERCISES IN POST SPINAL SURGERY: A NARRATIVE REVIEW

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Abstract

Background: Patients with severe lower back pain who do not respond to nonsurgical treatments for 3–6 months frequently have lumbar spine surgery (LSS). Pain and disability caused by lumbar disc herniation, spondylolisthesis, and stenosis are the most frequent reasons for lumbar surgery. Spinal stabilization exercises (SSE) have been used for a long time. The aim of this review was to verify the effect of SSE in post spinal surgery patients on quality of life, intensity of pain, disability, fear avoidance beliefs.

Study selection: This review was conducted on the databases from PubMed, Cochrane library and Google scholar in March 2024. Review included randomized controlled trials that investigated the above-mentioned outcomes and assessed SSE. This study included 7 randomised controlled trials on the effects of spinal stabilization exercises on post spinal surgery patients was performed.

Results and Conclusion: Disability and intensity of pain has decreased after SSE. Quality of life and fear related to work and physical activity were improved significantly.

Keywords: Rehabilitation, Spinal Stabilization Exercises, Spinal Surgery

Introduction

Low back pain (LBP) is one of the most prevalent musculoskeletal complaints with a point prevalence of 12–35%.¹ The diagnosis of degenerative lumbar spinal stenosis and back pain has increased over time due to longer life expectancies, the desire for a higher quality of life, awareness of the condition, and the availability of cutting-edge imaging tools. Pain and disability caused by lumbar disc herniation, spondylolisthesis, and stenosis are the most frequent reasons for lumbar surgery. Nevertheless, surgical treatment itself may provoke muscle atrophy and weakness, stiffness, fear of movement, and consequent disability in activities of daily living. Therefore, postoperative physical and mental health may be affected over than expected. For this

reason, different rehabilitation programs have been proposed, with the aim to accelerate the resolution of symptoms, especially pain, promoting functional recovery and return to work, reassuring patients, and finally preventing chronic pain, complications, and relapses.^{2z}

Numerous exercises have been suggested to reduce chronic low back pain, including lumbar stabilization exercises, motor control activities, core workouts, lumbar flexion exercises, walking exercises and bracing exercises have been proposed to mitigate chronic low back pain. These exercises focus on lumbar stabilization and core strengthening.

In past, there have been many studies done which say that spinal stabilization exercises are effective in post spinal surgery patients. The objective of this review is to estimate the effectiveness of spinal stabilization exercises interventions on pain, function, disability, fear avoidance beliefs and health in adults after a first surgery for lumbar disc herniation, lumbar spinal stenosis, or lumbar spondylolisthesis.

Methods

A thorough review of literature was conducted to include RCT in any type of spinal surgery which include lumbar stabilization exercises. Studies were searched from the following search engine PubMed, Cochrane library and Google scholar to review the literature. This review included randomized controlled trial that investigate the effect of spinal stabilization exercises on quality of life, intensity of pain, disability, functional mobility, walking speed, fear avoidance beliefs either isolated or associated with other interventions, in comparison with a control group, placebo or other intervention in patients after spine surgery.

Results

A total of 7 RCT studies were assessed in the review that included lumbar micro discectomy, lumbar discectomy, spinal fusion surgery, spinal decompression surgery with the follow up till 3 years.

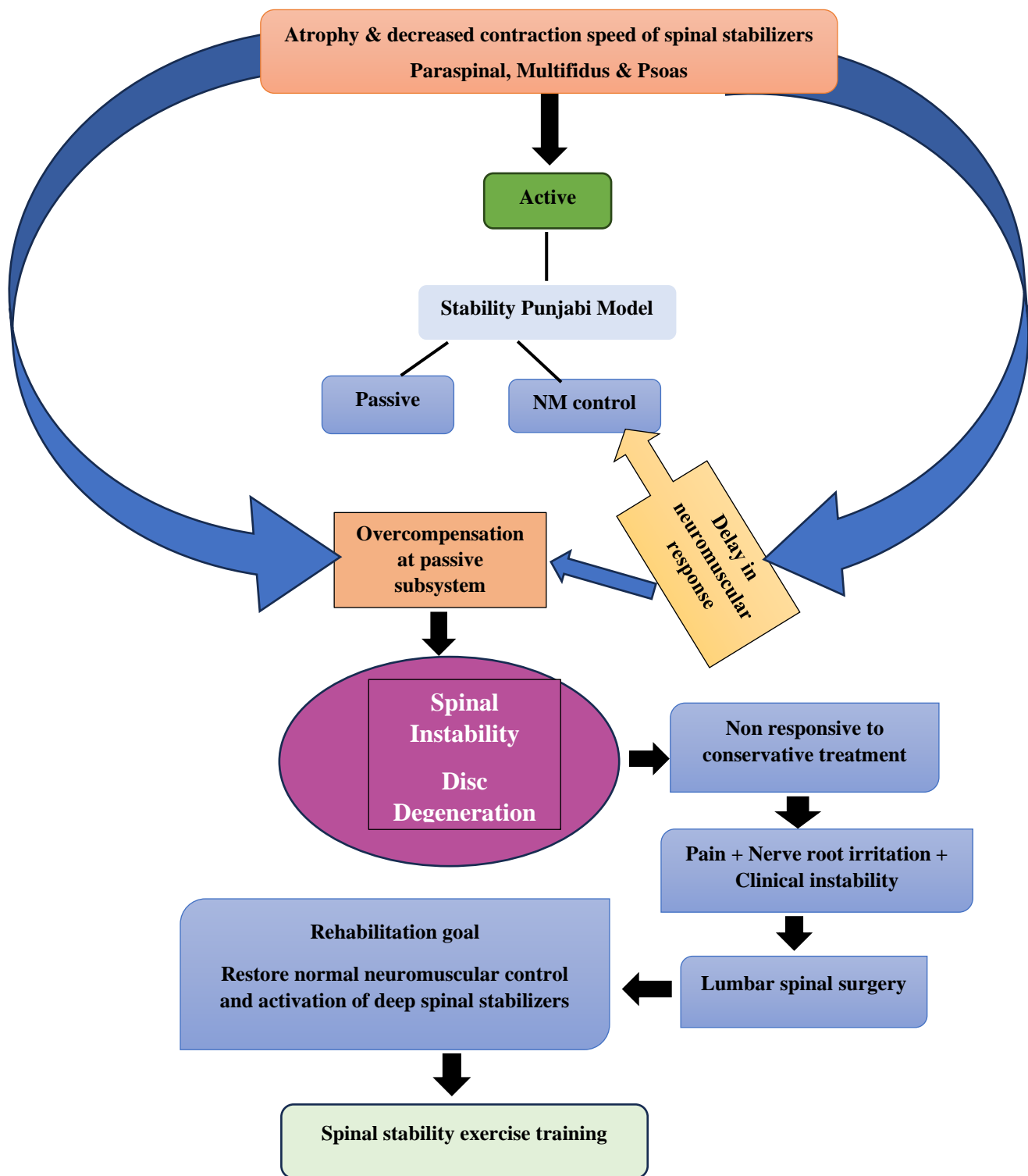
Auth ors& Year	Stud y desi gn	Sam ple	Sa mple siz e	Intervention	Outcom es	Follo w up	Results
Yilma z F et al, 2003 ³	RCT	Lum bar micr odis cect omy	42	Group 1: Dynamic stabilization exercises Group 2: Flexion- extension exercises (Williams- McKenzie) Group 3: Control	Pain Disabilit y Schober Trunk enduranc e Progressi ve isoinertia l lifting evaluatio n Depressi on	3 month s	Dynamic stabilisation group improved more than other two groups in all parameters except depression
Manni on AF et al, 2007 ⁴	RCT	Spin al deco mpr essio n surg ery	15 9	1 st control group Self-management for 12 weeks. 2 nd group Physiotherapy with spine stabilisation exercises (PT Stab Ex):30 min sessions	Pain Disabilit y Fear avoidanc e belief Modified somatic perceptio	24 month s	No significant difference between self-management and supervised rehabilitation on pain and disability. Also, no significant difference between two types of physiotherapy protocols.

				per week for 12 weeks. 3 rd group Physiotherapy using mixed techniques (PT-Mixed): 30 min sessions per week for 12 weeks.	n question naire ZUNG question naire		
Abbot t A et al, 2010 ⁵	RCT	Lum bar fusio n surge ry	10 7	The psychotherapy group 1 st 3 outpatient sessions for psychomotor therapy and home exercise program of Lumbopelvic stabilization 2 nd Group: (Home exercise group) received Stretches: hamstrings, hip abductor/ external rotator and quadriceps.	ODI, VAS, SF- 36(MH) Self- efficacy scale Tampa scale of Kinesio phobia Back belief's question naire Coping strategies to control pain	3 years	Psychomotor therapy improved functional disability, and fear of movement/ (re)injury significantly more than exercise therapy at respective follow-up occasions. Similar results occurred for pain coping but group differences were non-significant at 2 to 3 years follow-up
Demir S. et al, 2014 ⁶	RCT	Lum bar micro disce ctomy	44	Group 1: Dynamic lumbar stabilization exercises and home exercises. Group 2: control group (home exercises)	low back pain, leg pain, spinal mobility, ODI, Fear/regr ession beliefs through (FABQ) Nottingh am health profile	6 month s	DLS exercises may be recommended to patients following spinal surgery due to their benefits in reducing pain, increasing spinal mobility, and ensuring faster return to work periods.
Shaju MK et al, 2016 ⁷	pre and postt est expe rime ntal stud y.	Lum bar micro disce ctomy	20	Group 1: lumbar stabilization exercises Group 2: progressive strengthening exercises includes Thoracic elevation and leg lifts. Exercises were given two sessions per day and the same was	disability and intensity of pain were measure d by Roland Morris question naire and VAS	2 weeks	LSE are more effective than progressive strengthening exercises in reducing disability and pain among post lumbar micro discectomy subjects.

				continued for 14 days.			
Hou J et al, 2019 ⁸	RCT	Lumbar spinal surgery	168	Group 1: a mobile phone-based eHealth (electronic health) program (EH) exercises included were designed based on core stability exercise principles. Group 2: usual care treatment (UC).	ODI, VAS general mental health and quality of life (EuroQol-5 Dimension health questionnaire, and SF-36)	24 months	Mobile phone-based telerehabilitation system is effective in self-managed rehabilitation for postoperative patients with LBP. The effectiveness of eHealth was more evident in participants with higher compliance.
Elsayyad M et al, 2020 ⁹	RCT	Lumbar spine fusion	60	Group 1: Neural mobilization (NM) and stabilization exercises (SE), received NM for approximately 12 to 15 minutes per session, including 30 seconds hold and 1 minute rest. Group 2: received Myofascial release and SE Group 3: SE only	ODI, VAS and back range of motion (BROM)	1 month	Patients who received NM or MFR combined with SE demonstrated better improvement, in favour of the NM group, regarding disability and pain than patients who received SE alone after LSF.

Discussion

The result of the review shows that spinal stabilization exercises have been effectively used in post spinal surgery patients though it has not been found to be effective in long term follow up of 2-3 years but early beneficial effects in terms of reducing pain, disability and improving patients' beliefs have been found. The spinal stabilization exercises have also been effectively administered through telerehabilitation/mobile based program. One of the important inhibition of patients and spinal surgeons after spinal surgery is regarding risk of initiating an early exercises program after lumbar spinal surgery. However, the review through high quality study have shown no adverse effect on starting an early spinal stabilization exercises-based exercise program. The spinal stabilization exercises have been implemented both as home exercises and supervised exercises sessions. The research shows no superiority of spinal stabilization exercises to a mix physiotherapy-based exercises post spinal surgery is based on theoretical model of spinal stability given by Punjabi 1992a. Figure 1 briefly summarizes the stability model and role of spinal stability exercises training in post spinal surgery.



An atrophy and decreased contraction speed of spinal stabilizers of paraspinal, multifidus and psoas muscle leads to delay in neuromuscular response as well as their an over compression takes place at passive subsystems which can cause spinal instability and disc degeneration. Conservative treatment is provided and if there is no response of treatment it can further lead to pain, nerve root irritation and clinical instability. Therefore, lumbar spinal surgeries are recommended in order to obtain normal neuromuscular control and activation of deep spinal stabilizers. Hence the spinal stability protocol is given.

Punjabi (1992a) may give the first theoretical explanation of the meaning of the term core stability as used by clinician. In article Punjabi describes the core through three subsystems, the passive subsystem, active

subsystem, and the neural control subsystem. A person may be more vulnerable to discomfort, dysfunction, and damage if any one of these subsystems became compromised. This could result in spinal column instability. Inadequate control of spinal structures can result in repetitive microtrauma to soft tissues and joints, which can cause damage, pain, and dysfunction over time (Barr, Griggs, & Cadby, 2005).¹⁰

Table 2 presents the brief exercise program based on the review of literature which has been used in post spinal surgery patients.

Table 2: Spinal stabilization exercises program	
After Surgery(0-2weeks)	<ul style="list-style-type: none"> • Ankle dorsiflexion and plantar flexion • Diaphragmatic breathing, Static quadriceps, Gluteal muscles • Abdominal drawing in supine, Pelvic rolling, Pelvic tilting • High seating with brace
After Discharge (2-6 weeks)	<ul style="list-style-type: none"> • Dynamic quadriceps, Side lying hip abduction • Supine knee bent fall out, Wall supported semi squats • Abdominal hollowing in prone lying and sitting • Crook lying alternate heel slide, 4point kneeling pelvic shift • Alternate leg raises SLR in supine
Follow Up (6weeks to 24 weeks)	<ul style="list-style-type: none"> • Trunk curl in crook lying, Wall push-up • Transverse abdominal hollowing in quadruped position • Quadruped position: Lifting single arm, single leg, alternate arm and leg • Prone lying position: lifting single arm, single leg, alternate arm and leg • wall supported side lunges, forward lunges, and step-ups. • hip flexion in a seated position, hip flexion in standing with wall support, • 4-point kneeling shoulder flexion, 4-point kneeling hip flexion, and contra-lateral hip extension and shoulder flexion in a 4-point kneeling position.

Lumbar spinal fusion is used to stabilize one or more segments with the goal of reducing pain or nerve irritation. The spinal fusion is obtained with the help of instrumentation and bone grafting. The bone graft placed in the spine takes around 3-6 months to form a solid fusion due to this the surgeons restrict certain movements and are not enthusiastic to explore various exercises and rehabilitation strategies in early post-operative phases. But, with advances in surgical technique the current rigid instrumentation utilities in surgery is believed to provide adequate strategy for immediate mobilization. Evidence shows that early mobility in the acute care setting leads to decrease in pain and reduce length of hospital stay.¹¹

Conclusion

SSE has been extensively investigated in patient with spinal surgery. Spinal stabilization exercises improve quality of life, fear avoidance beliefs and decrease intensity of pain as well disability. Therefore, spinal stabilization exercises can be given in post spinal surgery patients.

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