Journal of Advanced Zoology

ISSN: 0253-7214

*Volume **44** Issue 5 **Year 2023** Page **1592 - 1599***

Effectiveness Of Pelvic Tilt Training Vs Core Strengthening For Chronic Lumbar Radiating Pain.

Pooja[1], Deepak Raghav[1], Shubham Sharma[1]

[1]mpt,
[1]professor/Principal
[1]assistant Professor, Department Of Physiotherapy, Santosh Deemed To Be University

***Corresponding Author:-** Prof.(Dr) Deepak Raghav*
**Professor/Principal Department Of Physiotherapy, Santosh Deemed To Be University*
Deepak.Raghav@Santosh.Ac.In

ABSTRACT-

Background Lumbosacral radiculopathy is a term used to describe a pain syndrome caused by compression or irritation of nerve roots in the lower back. It can be caused by lumbar disc herniation, degeneration of the spinal vertebra, and narrowing of the foraman from which the nerves exit the spinal canal. *Introduction* Lumbar radiculopathy (LR) is a condition characterized by motor, reflex, and/or sensory changes, such as radicular pain, paresthesia, or numbness in the lower limb which may be provoked by spinal posture(s) and/or movement(s).Proprioceptive Neuromuscular Facilitation (PNF) is a stretching technique utilized to improve muscle elasticity and has been shown to have a positive effect on active and passive range of motions.The core is defined as an anatomical box which consists of several muscle groups, such as the rectus abdominis at the front, the internal and external obliques on the lateral sides, the erector spinae, lumbar multifidus, and quadratus lumborum at the back, the diaphragm at the upper edge and the pelvic floor, and the iliac psoas at the bottom.*Need Of Study* To find out of investigation that PNF is more effective than core strengthening in lumbar radiculopathy in term of pain, ROM, flexibility and functionally.*Methods* thirty participants between the ages of 18 to 65 years diagnosed with unilateral chronic lumbar radiculopathy were randomly allocated into two groups (group a-pelvic PNF group B core strengthening). Group A performed pelvic PNF (anterior depression-posterior elevation, anterior elevation-posterior depression) with hot pack. Group B performed core strengthening. Group A (pelvic PNF) Repetition and Sets Are Formed according To the Patient Repetition Maximum (10RM) Fatigue Level and Condition. Group B perfomed core stability exercises given for 2 weeks with 10 repetitions and the next 2 weeks as home program with 20 repetitions for each exercise with hot pack. Both the group was treated for 4 weeks. Pre and post intervention measurements for pain intensity using NPRS, for flexibility using modified schober score and for functional performance using modified oswestry low back pain disability questionnaire.*Results* this study showed that, the PELVIC PNF highly significant improvement in all the outcome measures as compared to core strengthening when pre and post treatment parameters were compared after 4 weeks in NPRS, MODIFED OSWESTRYLOW BACK PAIN DISABILITY QUESTIONNAIRE, MODIFIED SCHOBER SCORE. P value is less than <0.05.*Conclusion* When we compare both the results. The PELVIC PNF exercise is better for chronic lumbar radiculopathy as compared to core strengthening exercise.

INTRODUCTION:-

Acute lumbosacral radiculopathy is a diffuse disease process that affects more than one underlying nerve root, causing pain, loss of sensation, and motor function depending on the severity of compression.(1)Lumbar radiculopathy is a condition characterized by motor, reflex and/ or sensory changes, such as radicular pain, paresthesia, or numbness in the lower limb which may be provoked by spinal posture and/or movement(s)(2).
Researchers also indicate the significance of the paraspinal and deep lumbar muscles as important stabilizers repetitive flexion is a frequent insult to the back. This generally occurs in occupation like such as building work, gardening, and house work etc. (3). Radiculopathy can occur in any part of the spine, but it is most common in the lower back (lumbar-sacral radiculopathy). (7)Radiculopathy and radicular pain commonly occur together, but radiculopathy can occur in the absence of pain and radicular pain can occur in the absence of radiculopathy.(8) Radicular pain and nerve root pain can be defined as a single symptom (pain) that can arise from one or more spinal nerve roots. Lumbar sacral radiculopathy is a disorder of the spinal nerve roots from L1 to S4.(9)
In the case of lumbar radiculopathy, this compressive force may occur within the thecal sac, as the nerve root exits the thecal sac within the lateral recess, as the nerve root traverses the neural foramina or even after the nerve root as exited the foramina. It may be related to disc bulging or herniation, facet or ligamentous hypertrophy, spondylolisthesis, or even neoplastic and infectious processes.[4]
Proprioceptive neuromuscular facilitation is a stretching technique utilized to improve muscle elasticity and has been shows to have a positive effect on active and passive range of motions.
Two techniques are seen the literature more frequently than others, the contract-relax method (CR) AND the contract-relax-antagonist-contact method (CRAC) of PNF.

The CR method included the target muscle (TM) being lengthened and held in that position while the participant contracted the TM to its maximum isometrically for an allotted amount of time. This was followed by a shorter relaxation of the TM that usually included a passive stretch(16).
The four theoretical mechanisms discussed in the literature will be further discussed in this review. These four mechanisms are: autogenic inhibition, reciprocal inhibition, stress relaxation, and the gate control theory (all of which provide potential ways for PNF to increase ROM).(5)
Core strengthening is a description of the muscular control required around the lumbar spine to maintain functional stability and particular attention has been paid to the core strengthening because the core serves as a muscular corset that works as a units to stabilize the body and spine, with and without limb movement and hence its strengthening helps to prevent and rehabilitate various lumbar spine and musculoskeletal disorders. (6)

Core muscles including the transverse abdominis, multifidus, diaphragm, and pelvic floor muscles are thought to contribute stability of the spine (10).
Reports have shown that transverse abdominis contracts first to contribute to stiffness as a feedforward function during upper limb activities[11)] and standing tasks involving sudden perturbation(11).
Contraction of trunk core muscles increases intra-abdominal pressure, providing stability and stiffness of the body(10,12,13).
Reports have also shown higher, stable intra-abdominal pressure is related to both postural reaction and stability of the spine in a situation when the base of support of a stance changed due to external forces (14)(15).

MATERIAL AND METHODOLOGY- It is a Comparative Study, and conveience sampling. The total number of subjects in the study is n=30 ,aged between 18-65 years. The data were selected according to inclusion and exclusion criteria. The intervention duration of the study is 4 weeks. And the study duration is 6 months. Data were collected from outpatient department of santosh college of physiotherapy, physiolite physiotherapy clinic(gaur city-2nd) and physiocare physiotherapy clinic(vijay nagar).

INCLUSION CRITERIA-
The inclusion criteria are Age 18-65 years having unilateral radiculopathy and pain in the distribution of sciatic nerve were include(17), L5/L4 root compression when distribution to the anterolateral aspect of the leg and dorsum of the foot.(17), Clinical tests- SLR, Slump test.(18), L5/S1 root compression when distributed to the posterioraspect of the leg extending to the heel and lateral aspect of the foot(17).

EXCLUSION CRITERIA-
The exclusion criteria are Lumbar disc herniation with bilateral radiculopathy(17), Other back conditions (e.g., failed back syndrome, spondylolysis/ spondylolisthesis, spinal stenosis, mechanical low back pain or neoplasmic and infection) (17), Participants with severe nerve root compression (non-ambulant/wheelchair-bound) or having cauda equine syndrome.(17).

MATERIALS USED:
- Plinth
- Inch tape.
- Paper
- Scale
- Patient record form
- Modified oswestry low back pain disablility ouestionnaire.

PROCEDURE
DATA COLLECTION- A signed consent was taken from patients and permission was also obtained from the head of the hospital where the study was conducted. study included 30 patients with chronic lumbar radiculating pain who full filled the inclusion and exclusion criteria and were randomly allocated into two groups, 15 subjects in each groups:

Group A(N=15) pelvic PNF training. In side lying position.
- Anterior elevation and posterior depression.
- Anterior depression and posterior elevation.

Group B(N=15)- Core strengthening training.
Core stability exercise gives for 2 weeks with 10 repetitions ,and the next 2 weeks as home program with 20 repetitions for each exercise.
Before giving the treatment hot fermentation will be provided for 20 to 30 min.

1 weeks
- Curl up exercises – with one leg bent to about 90 degree and other leg relaxed.
- Side bridges- lift the hips off the floor. Repeat to both sides.
- Leg and arm extension (Bird dog exercise)- from 4 points kneeling position raise the arm then return to beginning position and raise leg and again return to beginning position.

2 weeks
- Curl up exercise – with both knees bent about 90degree with raise the elbow off the floor.
- Side bridges – lift both legs off the floor .
- Leg and arm extension – with alternate arm and leg extension from 4- points kneeling position.

3-4 weeks
- Continue the same exercise with advance progression
- Curl up- with fingers on the fore head.
- Side bridges- support yourself on right hand extended.
- Leg and arm extension- alternate leg and arm extension.
- Subjects were evaluated at the beginning of the treatment , and after 4 weeks.
- All the subjects were assessed with NRPS, MODIFIED MODIFIED SCHOBER METHOD , and MODIFIED OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNARE.(19)

Results:

In this study with 30 subjects who were randomized in to two groups with 15 in group A (pelvic PNF) and 15 in group B (core strengthening).

TABLE -1 SHOWING OF AGE IN GROUP A

Group A	Age
Mean	34.60
Std. Deviation	7.139

TABLE -2 SHOWING DISTRIBUTION OF MALE AND FEMALE IN GROUP A

Group A	Frequency	Percentage
female	6	40.0
male	9	60.0
Total	15	100.0

GROUP B CORE STRENGTHEING TRANING GROUP

TABLE -3 SHOWING OF AGE IN GROUP B

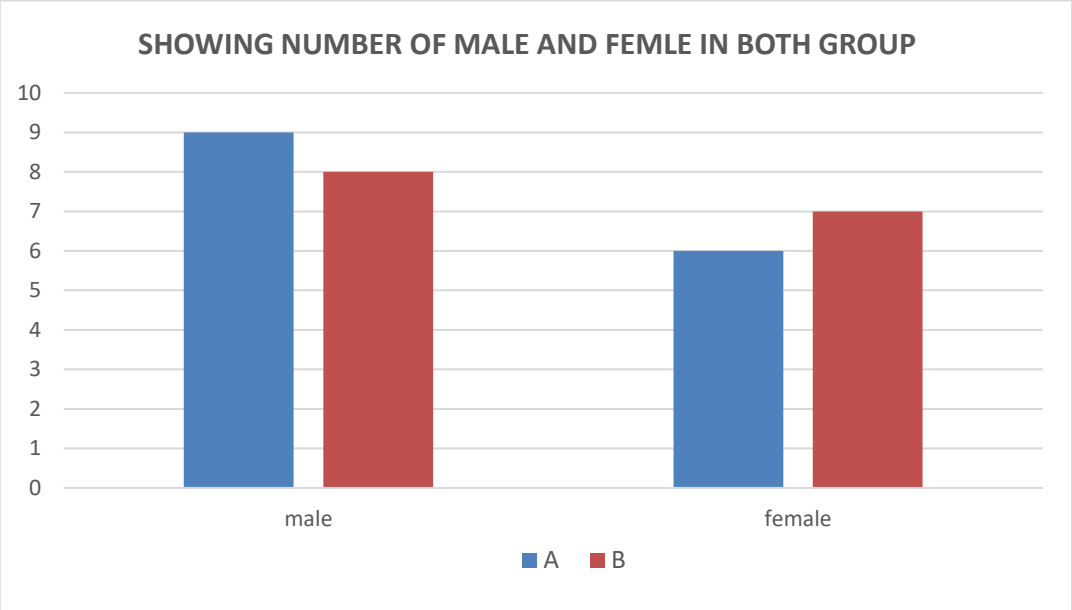
Group B	age
Mean	40.53
Std. Deviation	7.279

TABLE 4SHOWING DISTRIBUTION OF MALE AND FEMALE IN GROUP B

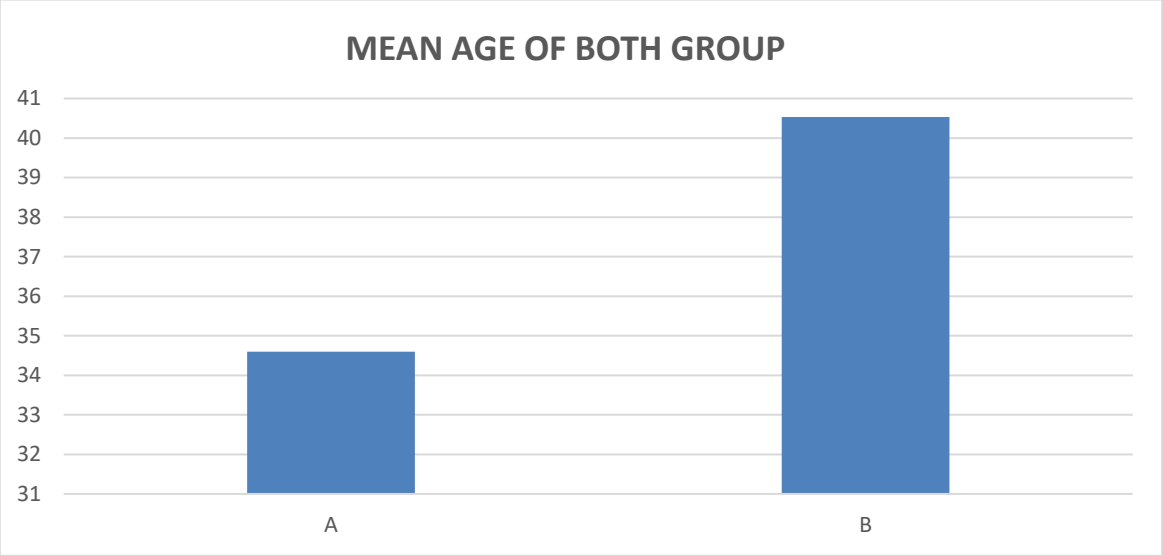
Group B	Frequency	Percent
female	7	46.7
male	8	53.3
Total	15	100.0

Graph-1 showing the distribution of male and female in both group.
Graph-2 showing the mean of age of both group (group A, group B.)

GRAPH -1



In graph- 1 A(blue bar) represent the number of male and B(red bar) represent the number of female in group A and group B.
GRAPH -2



COMPARISION BETWEEN MEAN OF POST TREATMENT PARAMETERS VALUE OF PELVIC PNF AND CORE STABILIZATION EXERCISE GROUP

Group Statistics				
	GROUP	Mean	Std. Deviation	p- value
Post Oswestry (%)	A	6.13	1.727	.000
	B	13.07	1.981	
Post Schober (Cm)	A	6.820	.2336	.000
	B	6.347	.1642	
Post Nprs(10)	A	2.20	.775	.000
	B	4.60	.507	

We can see that there is significant difference between mean of MODIFIED OSWESTRY, MODIFIED SCHOBER , AND NPRS treatment parameters. These parameters mean score is larger in pelvic PNF group than core stabilization group.

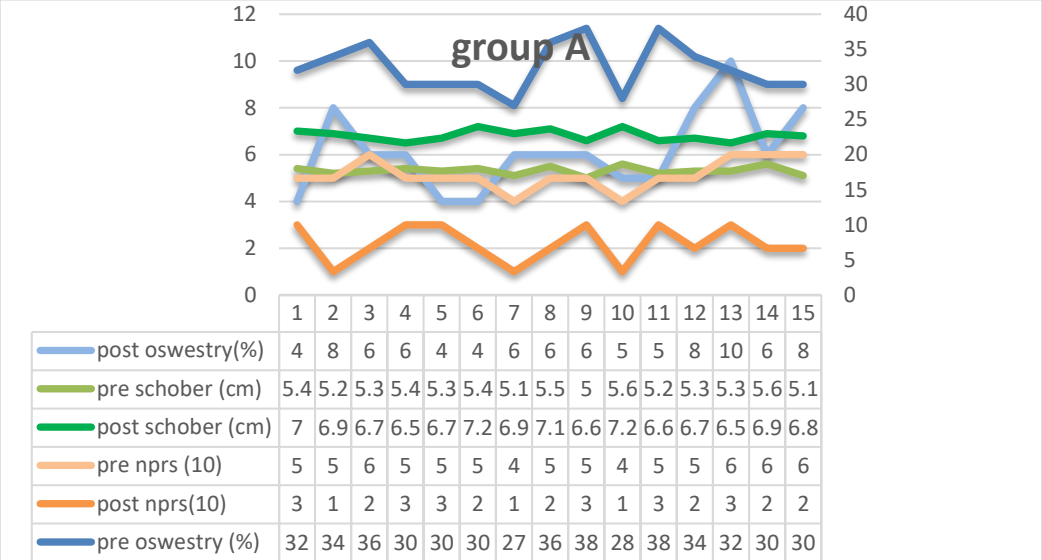
TABLE-12

t- test for equality of means							
		t	df	Significance		mean difference	std. error difference
				One – sided p	Two – sided p		
Post oswestry(%)	Equal variances assumed Equal variances not assumed	-10.219 -10.219	28 27.487	<.001 <.001	<.001 <.001	-6.933 -6.933	.678 .678
post schober (cm)	Equal variances assumed Equal variances not assumed	6.421 6.421	28 25.117	<.001 <.001	<.001 <.001	.4733 .4733	.0737 .0737
post nprs (10)	Equal variances assumed Equal variances assumed	-10.040 -10.040	28 24.138	<.001 <.001	<.001 <.001	-2.400 -2.400	.239 .239

A p value is less then 0.05 . so that both are the technique are significance.

GRAPH-9

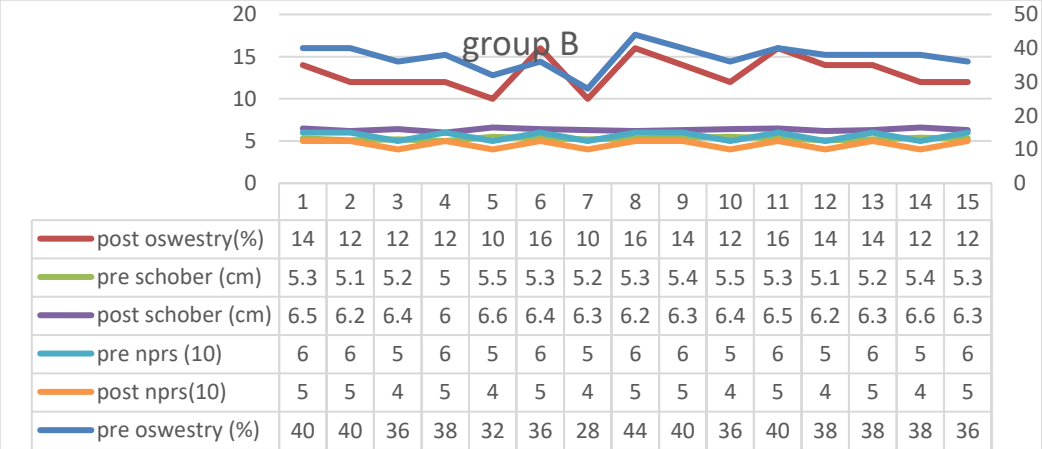
COMPARISION BETWEEN PRE AND POST TREATMENT PARAMETERS VALUE OF PELVIC PNF GROUP



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
post oswestry(%)	4	8	6	6	4	4	6	6	6	5	5	8	10	6	8
pre schober (cm)	5.4	5.2	5.3	5.4	5.3	5.4	5.1	5.5	5	5.6	5.2	5.3	5.3	5.6	5.1
post schober (cm)	7	6.9	6.7	6.5	6.7	7.2	6.9	7.1	6.6	7.2	6.6	6.7	6.5	6.9	6.8
pre nprs (10)	5	5	6	5	5	5	4	5	5	4	5	5	6	6	6
post nprs(10)	3	1	2	3	3	2	1	2	3	1	3	2	3	2	2
pre oswestry (%)	32	34	36	30	30	30	27	36	38	28	38	34	32	30	30

GROUP-10

COMPARISION BETWEEN PRE AND POST TREATMENT PARAMETERS VALUE OF CORE STABILIZATION EXERCISE GROUP



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
post oswestry(%)	14	12	12	12	10	16	10	16	14	12	16	14	14	12	12
pre schober (cm)	5.3	5.1	5.2	5	5.5	5.3	5.2	5.3	5.4	5.5	5.3	5.1	5.2	5.4	5.3
post schober (cm)	6.5	6.2	6.4	6	6.6	6.4	6.3	6.2	6.3	6.4	6.5	6.2	6.3	6.6	6.3
pre nprs (10)	6	6	5	6	5	6	5	6	6	5	6	5	6	5	6
post nprs(10)	5	5	4	5	4	5	4	5	5	4	5	4	5	4	5
pre oswestry (%)	40	40	36	38	32	36	28	44	40	36	40	38	38	38	36

DISCUSSION-

In the present study, the pelvic PNF group shows highly significant improvement in all outcome measures. Both group techniques improvement the functional performance. To measure the functional performance through modified oswestry low back pain disability questionnaire. The pre mean value of group A pelvic PNF is 32.333 and post mean value is 6.13.(table-5). and the pre mean value of group B core strengthening is 37.333 and post mean value is 13.07.(table-8). The oswestry low back pain questionnaire show significance difference between mean of both group. Pelvic PNF group show the lesser mean in comparison to core strengthening group mean that indicate the pelvic PNF is more beneficial to improve the functional performance n comparison of core strengthening group.

Susan S.Adler 2008, we treat pelvic patterns as isolated from the trunk if no great increased lumbar flexion and extension occurs. Biomechanically, it is impossible to move the pelvis without motion in the spine because it is connected with the spine.(21)

Atrophy results in extremely weak and easily fatigued muscles. Tired back muscles with lower endurance lead to an increase in bending stress on the ligaments and intervertebral discs. In addition to causing pain and inactivity, this can also cause reflex muscle inhibition, leading to further attenuation of back muscles and atrophy.(20).

Basher bello 2020 -Manual therapy has been indicated to relieve nerve compression through increased intervertebral disc space gapping, nucleus deformation, and simultaneous approximation in the alternate layers of the annulus, thereby producing favorable therapeutic effects on the intervertebral disc.(22).While decreased diffusion of water and loss of proteoglycans are hallmarks of disc degeneration, it has been suggested that fluid exchange is integral to maintaining disc nutrition.(17).

Pressure acts as a stimulant to neighboring tissues, reducing the sensitivity of the original tender point and thus resolving pain.(17).sciatic nerve manipulation may promote healing of the soft tissues by stimulating the functions of the nervous system to improve nervous system adaptability and decrease sensitivity, helping to alleviate the symptoms.(17).

Both group techniques show improvement in the lumbar mobility, flexibility and pain. To measure the flexibility through modified schober scale. The pre mean value of group A pelvic PNF is 5.313 and post mean value is 6.820. (Table-6). And the pre mean value of group B core strengthening is 5.2733 and post mean value is 6.347(table-9). The modified schober scale show significance difference between mean of both group. Pelvic PNF group show the higher mean in comparison to core strengthening group B to indicate that the pelvic PNF is more beneficial to increase the flexion of the spine in comparison to core strengthening in lumbar radiculopathy.

Comparison of pain level of both group through numerical pain rating scale (NPRS). The pre mean value of group A pelvic PNF is 5.133 and post mean value is 2.20 (table-7). The pre mean value of group B core strengthening is 5.6 and post mean value is 4.60. Pelvic PNF group A show the lesser mean in comparison to core strengthening to indicate that the pelvic PNF more beneficial to reduce the pain in comparison to core strengthening in lumbar radiculopathy.

Manual therapy may also elicit counterirritant effects in which large, fast-conducting afferent fibers in the substantia gelatinosa or adjacent interneurons inhibit the transmission of pain via spinothalamic tract.(17).

Pelvic PNF group also showed to improvement in lumbar mobility, and decreased back pain intensity.

P value of pelvic PNF group is less than 0.05. That indicate the pelvic PNF is significant in lumbar radiculopathy.

P value of core strengthening is less than 0.05. that indicate the core strengthening is significant in lumbar radiculopathy.

CONCLUSION-

our results showed that PELVIC PNF is better than the core strengthening for chronic lumbar radiculopathy.

REFERENCE

1) Dydyk AM, Khan MZ, Singh P. Radicular Back Pain. [Updated 2021 Nov 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-
2) Jens Adermann, Fabian Moll & Thomas Schilling. (2023) Die Relevanz lumbosakraler Übergangsvarianten in der manuellen Medizin und PhysiotherapieThe relevance of lumbosacral transitional vertebrae for manual medicine and physiotherapy. *Manuelle Medizin* 61:2, pages 86-94 Crossref
3) MCKENZIE METHOD WITH TENS ON LUMBAR RADICULOPATHY A RANDOMIZED CONTROLLED TRIAL. International Journal of Physiotherapy, 3(1), 94-99. https://doi.org/10.15621/ijphy/2016/v3i1/88919
4) Berry JA, Elia C, Saini HS, Miulli DE. A Review of Lumbar Radiculopathy, Diagnosis, and Treatment. Cureus. 2019 Oct 17;11(10):e5934. doi: 10.7759/cureus.5934. PMID: 31788391; PMCID: PMC6858271.
5) Hindle KB, Whitcomb TJ, Briggs WO, Hong J. Proprioceptive Neuromuscular Facilitation (PNF): Its Mechanisms and Effects on Range of Motion and Muscular Function. J Hum Kinet. 2012 Mar;31:105-13. doi: 10.2478/v10078-012-0011-y. Epub 2012 Apr 3. PMID: 23487249; PMCID: PMC3588663.
6) Malkia E, Ljunggren AE. Exercise programs for subjects with low back disorders. Scand J Med Sci sports. 1996; 6:73– 81
7) Iversen T, Solberg TK, Romner B, Wilsgaard T, Nygaard Ø, Brox JI, Ingebrigtsen T. Accuracy of physical examination for chronic lumbar radiculopathy. BMC musculoskeletal disorders. 2013 Dec 1;14(1):206.
8) Bogduk N. On the definitions and physiology of back pain, referred pain, and radicular pain. Pain. 2009 Dec 1;147(1):17-9.
9) Murphy DR, Hurwitz EL, Gerrard JK, Clary R. Pain patterns and descriptions in patients with radicular pain: Does the pain necessarily follow a specific dermatome?. Chiropractic & Osteopathy. 2009 Dec 1;17(1):9.

10) Malátová R, Rokytová J, Stumbauer J: The use of muscle dynamometer for correction of muscle imbalances in the area of deep stabilising spine system. *Proc Inst Mech Eng H*, 2013, 227: 896–903. [PubMed] [Google Scholar]
11) Cresswell AG, Oddsson L, Thorstensson A: The influence of sudden perturbations on trunk muscle activity and intra-abdominal pressure while standing. *Exp Brain Res*, 1994, 98: 336–341. [PubMed] [Google Scholar]
12) Willson JD, Dougherty CP, Ireland ML, et al.: Core stability and its relationship to lower extremity function and injury. *J Am Acad Orthop Surg*, 2005, 13: 316–325. [PubMed] [Google Scholar
13) 7. Hodges PW, Cresswell AG, Daggfeldt K, et al.: In vivo measurement of the effect of intra-abdominal pressure on the human spine. *J Biomech*, 2001, 34: 347–353. [PubMed] [Google Scholar]
14) Hodges PW, Cresswell AG, Thorstensson A: Intra-abdominal pressure response to multidirectional support-surface translation. *Gait Posture*, 2004, 20: 163–170. [PubMed] [Google Scholar]
15) Hsu SL, Oda H, Shirahata S, Watanabe M, Sasaki M. Effects of core strength training on core stability. J Phys Ther Sci. 2018 Aug;30(8):1014-1018. doi: 10.1589/jpts.30.1014. Epub 2018 Jul 24. PMID: 30154592; PMCID: PMC6110226.
16) Funk et al., 2003; Lucas and Koslow, 1984; Wallin et al., 1985
17) Dan-Azumi, Musa & Bello, Bashir & Yakasai, Abdulsalam & Kaka, Bashir. (2021). Two manual therapy techniques for management of lumbar radiculopathy: a randomized clinical trial. Journal of Osteopathic Medicine
18) The Sensitivity and Specificity of the Slump and the Straight Leg Raising Tests in Patients With Lumbar Disc Herniation Javid Majlesi, MD,* Halit Togay, MD,† Halil U¨ nalan, MD,‡ and Sadık Toprak, MD(2015) DOI: 10.1097/RHU.0b013e31816b2f99 · Source: PubMed
19) TY - JOUR AU - John, AU - Kalirathinam, Deivendran PY - 2013/10/31 SP - 41 EP - 52 T1 - Effectiveness of PNF Training for Chronic Low Back Pain 1 VL - 4 DO - 10.13140/2.1.1213.2486 JO - IOSR Journal of Nursing and Health Sciences ER -
20) GULSEN, Mustafa; KOZ, Mitat. EFFECT OF PROPRIOCEPTIF NEUROMUSCULAR FACILITATION AND LUMBAR STABILIZATION EXERCISES ON MUSCLE STRENGTH AND MUSCLE ENDURANCE IN PATIENTS WITH LUMBAR DISC HERNIA. European Journal of Physical Education and Sport Science, [S.l.], mar. 2019. ISSN 25011235. Available at: https://oapub.org/edu/index.php/ejep/article/view/2330
21) SUSAN S. ADLER, DOMINIEK BECKERS MATH BUCK, PNF IN PRACTICE THRD EDITION 2008
22) Mulligan BR. Update on spinal mobilisations with leg movement. J Man Manip Ther 1997;5:184–7