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Conservative Treatment Options for Patients of Chronic Sciatica*

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ABSTRACT

This Randomized control trail research designs a proposed rehabilitation program using conservative treatment: McKenzie exercises and electrical stimulation TENS (Transcutaneous Electrical Nerve Stimulation) and diclofenac to relieve chronic sciatica pain. Sciatica is a common cause of pain and disability, has a less favorable outcome. However, conservative treatment including McKenzie exercises, TENS and Diclofenac have very effectible outcomes for lumber back pain including sciatica conducted on 300 patients to show its effect in reducing pain and other associated symptoms. The research sample was chosen by the intentional method from Zayn al-Abidin hospital and Sayyida Khadija al-Kubra hospital. Study research duration was from August 2022 to August 2023. We used oxford scale for muscle strength, VAS (visual analog scale for pain), and goniometer for joint range of motion (ROM). Results showed that there was a significant improvement in diclofenac group more than TENS and McKenzie exercises in reducing pain ($p=0.006$) ($p=0.001$) and improve knee flexion ROM ($P=0.548$), increasing muscle power. There was a significant decrease in patient pain by TENS modality and increase in muscle power by all treatment methods, the knee flexion ROM improved in diclofenac, but no significant difference between the two other treatment Group .

Keywords: Sciatica, pain management, McKenzie exercises, TENS, diclofenac.

1. Introduction

A relationship between pathology of the lumbar spine and leg pain was already suspected by the ancient Greeks and Egyptians. Hippocrates was allegedly the first to use the term Sciatica, from the Greek word for hip ‘ischios’[1]. Although sciatica is a commonly used term, it may also cause confusion because it has been used to describe any type of back or leg pain [2]. But in most cases, and also in this paper, sciatica is used to describe pain that radiates downwards from the buttock along the

course of the lumbosacral nerve roots. An alternative term for sciatica that is often used is lumbar radiculopathy. The sciatic nerve (SN), which originates from the ventral root of the spinal nerves (L4 to S3), runs along the back of the thigh [3]. It exits the pelvis through the greater sciatic foramen below the piriformis, and at the level of the upper angle of the popliteal fossa, it splits into the Common Peroneal Nerve (CPN) and Tibial Nerve (TN). Spondylolisthesis, foraminal stenosis, lumbar stenosis, and cancer are rarer causes [4]. The lumbar nerve root is compressed, which may lead to inflammation, and is the common factor in all of these diseases. Evidence suggests that a mix of pressure-related, inflammatory, and immunological processes, rather than just pressure on the nerve root, is what causes sciatica [5]. Physiotherapy, which tries to improve the patient with sciatica's physical and mental health, is a crucial part of conservative treatment [6]. Therapeutic exercises and electrical stimulation are considered part of the therapeutic intervention for treating sciatica in addition to other treatment methods, but in particular pain control modalities such as Trans Cutaneous Electrical Nerve stimulation (TENS), rehabilitation exercises and diclofenac treatment that are going discussed in this research [7]. The aim of this study is to obtain a therapeutic result from the treatment with modalities (TENS), the effect of Mackenzie exercises, and the effect of diclofenac on a patient with chronic sciatica. The Sciatic peripheral neuropathy is a sever radiating pain felt from low back to one or both legs. In about 90% of sciatica is caused by herniated disc with sciatic nerve root compression. This condition becomes chronic if it lasts 3 months or being recurrent sciatica. Anyway, sciatica considered as advance stage [8-9].

Sciatic nerve is the longest and largest nerve in the human body and it's the nerve where derivative from the sacral plexus. Arises from the anterior rami of the lower lumbar (L4-L5) and upper sacral spinal nerves (S1-S2-S3) from these spinal nerves sciatic nerve contains fibers from two divisions the posterior and anterior. The lumbosacral area is where the sciatic nerve originates it descending to the thigh posteriorly. Then the nerve splitting into two main terminal branches the tibial nerve and common peroneal nerve before entering the popliteal fossa [10]. The main function of the sciatic nerve is to supply the skin and muscles in the thigh, leg, and foot with sensory and motor signals [11].

Origin	(L4_ L5) (S1 _S2_ S3)
Branches	Tibial nerve which continues to posterior compartment of leg and foot, common fibular (peroneal) nerve that travel to down to anterior and lateral compartment of the leg and foot.

Supply	Motor: long head of biceps femoris .M., short head of biceps femoris .M. Superficially adductor Magnus .M., laterally to semitendinosus and semimembranosus muscles. Sensory: Posterior thigh, posterolateral leg, dorsum and sole of the foot.[12]
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The sciatica may develop in many ways, among most common causes like discs herniation. This slippage may lead the L5 nerve root to pinch as it leaves the spinal cord, Degenerative disc, Piriformis syndrome [13].

The symptoms of sciatica include:

- Numbness or weakness in lower back, buttock, leg or feet.
- Moderate to severe pain in lower back.
- “Pins and needles” that patient may feel down to his/her legs, feet or toes
- Pain that worsens with motion, may result in loss of movement.
- The patient may lose bowel and bladder control due to cauda equine Clinical signs of sciatica include:
- Difficulty external rotation and abduction of the hip joint.
- Foot drop.
- Equinus or Equinovarus deformity.
- Muscle weakness or atrophy [14].

Risk factors:

- Age: sciatica frequently occurs between 30 and 60 years.
- Obesity.
- Prolonged sitting: Those who sit for a long time are more likely to develop sciatica.
- Diabetes.
- Inactivity life style
- Sex: women are more susceptible than men [15].

The diagnosis started with complete history of patient: To ask patient when did your pain started? Where the pain travels? And what it's exactly feel like? Then perform some physical examination on him. The physical examination assessment of sciatic neuropathy may begin with straight leg raise (SLR). Straight leg raise can be performed actively or passively by the specialized by raising one of lower extremities of the client/patient while lying supine with the knee joint extended [16]. Because sciatic neuropathy might be caused by piriformis syndrome [17]. it's essential to assess the piriformis muscle for tightness that cause due to the compression against the sciatic nerve, so this can be done by palpation and via assessing the muscle ability to lengthen by stretching it [18].

Slump test: This test begins with patient setting upright with both hands behind the back. Then the patient bends /slumps facing forward at the hip, bends their neck so that their chin touches their chest, and one of the knees is extended to a possible degree. If this position may cause any pain or discomfort, sciatica might be presented [19,20]. Doctors may use some imaging tools for diagnosis such as X-rays, computerized tomography (CT) and magnetic resonance imaging (MRI), this can help them to determine which nerve roots are affected [21].

The management includes:

- Medications: such as anti-inflammatories medications, muscle relaxants, anti-seizure, and tricyclic antidepressants.
- Physical therapy:
- Steroid injections.
- Surgery: This option is only considered when the affected nerve has caused extreme
- Weakness [22,23,24].

2. Methods

Study design	Randomized controlled trial
Source of collection sample	Zayn al-Abidin Hospital Sayyida Kadija al-Kubra Hospital.
Duration of study	One year from 1 August 2022 to 1 August 2023
Inclusion criteria	All patients diagnosed with chronic sciatic neuritis and their ages between 30 and 60 years.
Exclusion criteria	-pregnant women -Oncology patients -Diabetics

Medications such as:

Diclofenac (50-75mg/day) administrated orally showed moderate quality of relieving pain in chronic sciatica [25,26].

Contraindication:

Hypersensitivity to diclofenac, asthma, peptic ulcer, kidney or liver disease and coronary artery bypass graft (CABG) are the most common contraindications for diclofenac [27].

On the other hand, physiotherapy treatment modalities, such as TENS, are used including exercises in general [28,29].

TENS (Trans Cutaneous Electrical Nerve Stimulation):

Is a non-invasive, safe, inexpensive, and easy to use electrical stimulation technique that delivers specific electrical pulses through the skin for stimulate nerves, reduce pain and treats disease. These methods effectively outcomes by increasing the blood flow (circulation) in the affected area thus improving pain. Based on frequency of stimulation, intensity, and the electrode placement on skin [30].

Contraindication:

Not everyone can use TENS, because it's not safe to use without medical advice. The TENS is contraindication in:

- There is a pacemaker or metallic implant.
- Pregnancy, especially in early pregnancy.
- Neurological condition such as epilepsy.
- Loss of skin sensation.

The McKenzie method of mechanical diagnosis and therapy (MDT)) was developed in the 1950s by New Zealand physiotherapist Robin McKenzie is a technique primarily used in physical therapy. And in 1981, he launched the concept of Mechanical Diagnosis and Therapy (MDT), a technique that includes diagnosis and assessment. The McKenzie exercise is a treatment method for patients who suffering from low back pain [31]. The McKenzie method relies on 3 steps, the first is evaluation, the second is treatment, and the third is prevention. The first taking history and performing physical examination, Treatment aims to centralize pain and reduce symptoms. As for prevention, it includes teaching and encouraging the patient to exercise regularly and take care of his health. In fact, many evidences indicate the importance of the Mackenzie method in reducing chronic low back pain, and it has effectiveness [32]. The short term and the long term as well. In this article, there is a breakdown of how to perform the McKenzie method exercises, and other information

INDICATION	CONTRAINDICATION
Low back pain	Pathological back fracture
Extremity pain	Cancer
Neck pain	Infection
	Bowel and bladder problems

Type of McKenzie exercise:

1. Prone press-ups or Cobra stretch
2. Stright leg rises
3. Lying Supine with Knees to Chest
4. Lying Prone.

3. Statistical Study

IBM SPSS (version 20) was used for Statistical study. Means, standard deviations (SD), Frequency and percentages were enclosed for basic Descriptive. One-way Anova was used to compare between the three groups. P value <0.05 was appraised as statistically significant.

4. Results

The study included a group of 300 patients with Sciatica who fulfilled the criteria of the study. As shown in This Chart shows the statistical difference between genders in each treatment group.

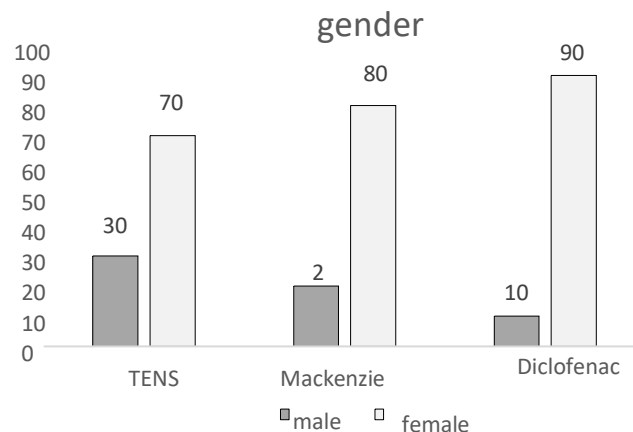


Table 1. The distribution of patients according to age group.

Age group	TENS		Mackenzie-exercises		Diclofenac	
	Frequency	%	Frequency	%	Frequency	%
30-40	20	20%	0	0%	20	20%
41-50	50	50%	60	60%	50	50%
51-60	30	30%	40	40%	30	30%
Total	100	100%	100	100%	100	100%
	Mean $\pm$ SD =46.5 $\pm$ 8.04		Mean $\pm$ SD = 49.7 $\pm$ 6.18		Mean $\pm$ SD = 44.4 $\pm$ 6.72	

Table (2) The comparison between pre-treatment and post-treatment for each treatment group.

variables		TENS Mean $\pm$ SD	Mackenzie exercises Mean $\pm$ SD	Diclofenac Mean $\pm$ SD	p-value
Pain	Pre- treatment	8.4 $\pm$ 0.966	7 $\pm$ 1.25	8.3 $\pm$ 1.06	0.006
	Post- treatment	4.5 $\pm$ 0.95	6.4 $\pm$ 1.26	5.3 $\pm$ 0.95	
Muscle power	Pre- treatment	3.7 $\pm$ 0.48	3.6 $\pm$ 0.516	3.3 $\pm$ 0.66	0.001
	Post- treatment	4.4 $\pm$ 0.7	4.6 $\pm$ 0.516	4.7 $\pm$ 0.48	
Knee flexion ROM	Pre- treatment	85.1 $\pm$ 9.17	87.4 $\pm$ 9.52	84.9 $\pm$ 9.08	0.548
	Post- treatment	96.5 $\pm$ 10.41	101.3 $\pm$ 10.48	100.1 $\pm$ 9.26	

5. Discussion

Our study showed that the comparison between (pre-treatment and post -treatment) for all groups

(TENS, Mackenzie and TENS + diclofenac) for variable pain is high sig at the interval 59% that means there exist response for treatment in all groups with greatest pain relief in the TENS group. However, in the multicenter Italian study [30], the percentage of clinical improvement after TENS was 31% and after exercise was 7%.

For variable muscle power, the comparison between (pre-treatment and post-treatment) for three groups is high sig. at the Interval 95% that means there is significant improvement in muscular strength, the improvement was better by applying.

Comparison of treatment methods for variable knee flexion in our study showed that the greatest improvement was by applying diclofenac as it is a non-steroidal anti-inflammatory drug, It works by stopping the production of prostaglandins in the body, which have a number of effects, including causing inflammation by blocking the effect of COX enzymes, fewer prostaglandins are produced, which means pain, inflammation and edema are eased. [33]

By analogy the Amsterdam study which indicated that 27% of patients who underwent physiotherapy had no longer movement limitation at all.

6. Conclusion:

The most affected age group was those between (41-50) years old. The comparison between all three groups showed that TENS, Mackenzie exercises and diclofenac have had good effects in reducing pain, but TENS showed statistically significant response better than the other two. For increasing muscle power by all three therapeutic methods, they all presented a good response, but as in comparison between them, diclofenac treatment gives progressive effects on muscle strength, therefore, there was an increasing range of motion, but no significant difference between pre-treatment and post-treatment of the two other group.

References

- [1] Lazarevic LK . Ischias postica Contunnii: Ein Beitrag zu deren Differential-Diagnose. Allg Wien Med Ztg
<https://pubmed.ncbi.nlm.nih.gov/13048855/>
- [2] Mulleman D, Mammou S, Griffoul I, Watier H, Goupille P. Pathophysiology of disc-related sciatica. I. Evidence supporting a chemical component. Joint Bone Spine
<https://pubmed.ncbi.nlm.nih.gov/16046173/>

- [3] Younes M, Bejia I, Aguir Z, Letaief M, Hassen-Zroer S, Touzi M, et al. Prevalence and risk factors of disc-related sciatica in an urban population in Tunisia. *Joint Bone Spine* <https://pubmed.ncbi.nlm.nih.gov/16725362/>
- [4] Hashemi M, Halabchi F. Changing Concept of Sciatica: A Historical Overview. *Iran Red Crescent Med J*. 2016 Feb; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4863142/>
- [5] Oliveira CB, Maher CG, Pinto RZ, Traeger AC, Lin C-WC, Chenot J-F, et al. Clinical practice guidelines for the management of non-specific low back pain in primary care: an updated overview. *Eur Spine J*. <https://pubmed.ncbi.nlm.nih.gov/29971708/>
- [6] Valat J-P, Genevay S, Marty M, Rozenberg S, Koes B. Sciatica. *Best Pract Res Clin Rheumatol*. <https://pubmed.ncbi.nlm.nih.gov/20227645/>
- [7] Khadilkar A, Odebiyi DO, Brosseau L, Wells GA. Transcutaneous electrical nerve stimulation (TENS) versus placebo for chronic low-back pain. *Cochrane Database Syst Rev* 2008; <https://pubmed.ncbi.nlm.nih.gov/18843638/>
- [8] Vroomen PCAJ, Krom MCTFM de, Slofstra PD, Knottnerus JA. Conservative treatment of sciatica: a systematic review. *J Spinal Dis* 2000; <https://pubmed.ncbi.nlm.nih.gov/11132976/>
- [9] Rantonen J, Karppinen J, Vehtari A, Luoto S, Viikari-Juntura E, Hupli M, Malmivaara A, Taimela S. Effectiveness of three interventions for secondary prevention of low back pain in the occupational health setting - a randomised controlled trial with a natural course control. *BMC Public Health*. 2018 May <https://pubmed.ncbi.nlm.nih.gov/29739371/>
- [10] Eastlack J, Tenorio L, Wadhwa V, Scott K, Starr A, Chhabra A. Sciatic neuromuscular variants on MR neurography: frequency study and interobserver performance. *Br J Radiol*. 2017 Nov; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5963375/>
- [11] Son BC, Lee C. Piriformis Syndrome (Sciatic Nerve Entrapment) Associated With Type C Sciatic Nerve Variation: A Report of Two Cases and Literature Review. *Korean J Neurotrauma*. 2022 Oct; <https://pubmed.ncbi.nlm.nih.gov/36381454/>
- [12] Bharadwaj UU, Varenika V, Carson W, Villanueva-Meyer J, Ammanuel S, Bucknor M, Robbins NM, Douglas V, Chin CT. Variant Sciatic Nerve Anatomy in Relation to the Piriformis Muscle on Magnetic Resonance Neurography: A Potential Etiology for Extraplural Sciatica. *Tomography*. 2023 <https://www.mdpi.com/2379-139X/9/2/39>
- [13] Shiri R, Euro U, Heliövaara M, Hirvensalo M, Husgafvel-Pursiainen K, Karppinen J, Lahti J, Rahkonen O, Raitakari OT, Solovieva S, Yang X, Viikari-Juntura E, Lallukka T. Lifestyle Risk Factors Increase the Risk of Hospitalization for Sciatica: Findings of Four Prospective Cohort Studies. *Am J Med*. 2017 Dec; <https://pubmed.ncbi.nlm.nih.gov/28750940/>
- [14] Ashworth J, Konstantinou K, Dunn KM. Prognostic factors in non-surgically treated sciatica: a systematic review. *BMC Musculoskelet Disord*. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3287121/>
- [15] Atkinson TM, Rosenfeld BD, Sit L, Mendoza TR, Fruscione M, Lavene D, Shaw M, Li Y, Hay J, Cleeland CS, Scher HI, Breitbart WS, Basch E. Using confirmatory factor analysis to evaluate construct validity

- of the Brief Pain Inventory (BPI). *J Pain Symptom Manage* 2011; <https://pubmed.ncbi.nlm.nih.gov/21131166/>
- [16] Kigozi J, Konstantinou K, Ogollah R, Dunn K, Martyn L, Jowett S. Factors associated with costs and health outcomes in patients with back and leg pain in primary care: a prospective cohort analysis. *BMC Health Serv Res*. 2019; <https://pubmed.ncbi.nlm.nih.gov/31226997/>
- [17] Hicks BL, Lam JC, Varacallo M. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Sep 4, 2022. Piriformis Syndrome <https://www.ncbi.nlm.nih.gov/books/NBK448172/>
- [18] Di Ciaccio E, Polastri M, Bianchini E, Gasbarrini A. Herniated lumbar disc treated with Global Postural Reeducation. A middle-term evaluation. *Eur Rev Med Pharmacol Sci* 2012; <https://pubmed.ncbi.nlm.nih.gov/22913158/>
- [19] Vroomen PC, De Krom MC, Wilmsink JT, Kester AD, Knottnerus JA. Diagnostic value of history and physical examination in patients suspected of lumbosacral nerve root compression. *J Neurol Neurosurg Psychiatry*. 2002; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1737860/>
- [20] Jungen MJ, Ter Meulen BC, van Osch T, Weinstein HC, Ostelo RWJG. Inflammatory biomarkers in patients with sciatica: a systematic review. *BMC Musculoskelet Disord*. 2019; <https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-019-2541-0>
- [21] Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. *Ann Intern Med* 2002. <https://pubmed.ncbi.nlm.nih.gov/12353946/>
- [22] Mathieson S, Kasch R, Maher CG, Pinto RZ, McLachlan AJ, Koes BW, et al. Combination drug therapy for the management of low back pain and sciatica: systematic review and meta-analysis. *J Pain*. 2019; <https://pubmed.ncbi.nlm.nih.gov/30585164/>
- [23] Peul WC, van Houten HC, van den Hout WB, Brand R, Eekhof JAH, Tans JTJ, Thomeer RT WM, Koes BW for the Leiden–The Hague Spine Intervention Prognostic Study Group. Surgery versus prolonged conservative treatment for sciatica. *N Engl J Med* 2007; <https://pubmed.ncbi.nlm.nih.gov/17538084/>
- [24] Pinto RZ, Maher CG, Ferreira ML, Ferreira PH, Hancock M, Oliveira VC, et al. Drugs for relief of pain in patients with sciatica: systematic review and meta-analysis. *BMJ*. 2012; <https://www.bmj.com/content/344/bmj.e497>
- [25] Pinto RZ, Verwoerd AJH, Koes BW. Which pain medications are effective for sciatica (radicular leg pain)? *BMJ*. 2017; <https://pubmed.ncbi.nlm.nih.gov/29025735/>
- [26] Nagendra S, Chunduri, Tanveer Kollu, Venkateswarulu R. Goteki, Kiran K. Mallela, and Krishnaveni Madasu. Efficacy of aceclofenac and diclofenac sodium for relief of postoperative pain after third molar surgery: A randomised open label comparative study; *J Pharmacol Pharmacother*. 2013 Apr-Jun; <https://pubmed.ncbi.nlm.nih.gov/23761713/>
- [27] Luijsterburg PA, Verhagen AP, Ostelo RW, Van Den Hoogen HJ, Peul WC, Avezaat CJ, et al. Physical therapy plus general practitioners' care versus general practitioners' care alone for sciatica: a randomized clinical trial with a 12-month follow-up. *Eur Spine J*. 2008; <https://pubmed.ncbi.nlm.nih.gov/18172697/>

- [28] Ostelo RWJG (2020) Physiotherapy management of sciatica. Journal of Physiotherapy © 2020 Australian Physiotherapy Association. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license <https://pubmed.ncbi.nlm.nih.gov/32291226/>
- [29] G.A. CHECCHIA, G. LETIZIA MAURO, G. MORICO, A. ORIENTE, C. LISI, V. POLIMENI, M. LUCIA, M. RANIERI; ON BEHALF OF THE MANAGEMENT OF PERIPHERAL NEUROPATHIES STUDY GROUP Observational multicentric study on chronic sciatic pain: clinical data from 44 Italian centers European Review for Medical and Pharmacological Sciences 2017; <https://www.europeanreview.org/article/12536>
- [30] Huber J, Lisinski P, Samborski W, Wytra _zek M. The effect of early isometric exercises on clinical and neurophysiological parameters in patients with sciatica: an interventional randomized single-blinded study. Isokinet Exerc Sci. <https://www.semanticscholar.org/paper/The-effect-of-early-isometric-exercises-on-clinical-Huber-Lisi%C5%84ski/ea4a6eec5f1bcbe7c700b1f0c0bb2d1bc1762f30>
- [31] Miranda H, Viikari-Juntura E, Martikainen R, Takala E, Riihimäki H. Individual factors, occupational loading, and physical exercise as predictors of sciatic pain. Spine 2002; <https://pubmed.ncbi.nlm.nih.gov/12004179/>
- [32] Machado GC, Witzl eb AJ, Fritsch C, Maher CG, Ferreira PH, Ferreira ML. Patients with sciatica still experience pain and disability 5 years after surgery: A systematic review with meta-analysis of cohort studies. Eur J Pain 2016; <https://pubmed.ncbi.nlm.nih.gov/27172245/>
- [33] Michael Stewart, Sid Dajani 4 Mar 2021 Meets Patient's editorial guidelines Medicines Analgesics and Pain Medication, Diclofenac for pain and inflammation <https://patient.info/medicine/diclofenac-for-pain-and-inflammation-dicloflex-diclomax-voltarol> .