RESEARCH ARTICLE

COMPARISON BETWEEN EFFECTS OF PASSIVE VERSUS SELF-MOBILIZATION OF SCIATIC NERVE IN PIRIFORMIS SYNDROME FOR RELIEVING PAIN AND IMPROVING HIP OUTCOMES

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Received on: 07-12-2021
Revision on: 03-03-2022
Published on: 31-03-2022

Citation; Salam A, Khalid A, Waseem I, Mahmood T, Mahmood W Comparison between effects of passive versus self-mobilization of sciatic nerve in piriformis syndrome for relieving pain and improving hip outcomes T Rehabili. J. 2021:06(01);298-302
soi: 21-2017/re-trjvol06iss01p298
doi: https://doi.org/10.52567/trj.v6i01.114

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ABSTRACT

Background: Piriformis syndrome is disorder which is neuromuscular, caused by sciatic nerve compression and lead to compromised Hip functions. This problem, as well as the management for the restoration of hip functions need to addressed. **Objective:** To determine the effectiveness of passive mobilization versus self-mobilization in managing pain and improving quality of life in patients with Piriformis syndrome. **Methodology:** A quasi-experimental study was conducted at Imran Idrees Hospital Sialkot from April to October 2019. The simple random sampling was used to collect n=30 subjects with pain in the gluteal region from >2 months, both genders in age of 30-50 years were included. The Passive Sciatic Mobilization was given in one group, while other group was only taught the self-mobilization of the sciatic nerve along with home plan. The Visual analogue scale and hip outcomes were measured at baseline, 2nd, 3rd, and 4th week using International Hip Outcome Tool (IHOT) Repeated measurement ANOVA for within-group and independent-sample t-test between groups were used. The level of significance was set at 95% ($p<0.05$).**Results:** The mean age of participants in self-mobilization was 41.20 ±5.79 and passive mobilization was 42.87 ±4.82. The mean of pain at baseline in experimental group was 4.86± 1.30 and reduced to 2.06 ± 1.09 after 4 weeks of passive mobilization and Hip functions at baseline was 131.73 ± 22.59 and improved to 232.00 ± 19.39. Between the groups comparison of pain and hip functions showing that both techniques were effective in reduction of pain and improving Hip functions but passive mobilization group has was dominant over the self-mobilization $p<0.001$ **Conclusion:** The passive mobilization of sciatic nerve was effective in the management of piriformis syndrome compared to the self-mobilization for improving pain and hip functions.

Key words: Hip joint, hip pain, nerve mobilization, piriformis syndrome, passive mobilization, sciatic nerve, self-stretching

INTRODUCTION

The piriformis syndrome (PMS) is a disorder that is neuromuscular in nature and caused when the sciatic nerve is compressed in the infra piriformis canal. [1] When there is tightness in the piriformis muscle it exerts pressure on the involved nerve leading to irritation and generating unpleasant sensations in the posterior part of the leg. Males' and females' prevalence of sciatic symptoms are not different but depends on the occupational status. A study conducted in Bangladesh, the prevalence of piriformis syndrome was found 3.7% for women and 5.1% for men.[2] Neural mobilization (NM) is used for certain neuromuscular conditions like carpal tunnel syndrome and back pain.[3] The researchers also concluded that NM is not beneficial as compared with other interventions. There are different methods using NM which includes sliding and tension methods.[4] lengthening of the involved nerve bed at one joint while shortening at other is known as sliding.[5] Sliding and tension techniques have proved to generate biomechanical effects and sliding play important role in reducing inflammation. While reduction in intraneural swelling and stoppage of circulation by changing pressure is the mechanism of nerve tension technique.[6] Self-mobilization methods for the sciatic nerve proved effective in patients with low back pain.[7] Neural mobilization along with conventional treatment was found out to be more effective in relieving pain than conventional therapy.[8] The piriformis syndrome was found to be non-disco genic origin and patients have normal neurological tests and straight leg raise can be negative.[9] Generally, degenerative changes in the joints and muscles lead to such issues. Furthermore, when physiotherapy manoeuvres to relieve the sciatic nerves are applied, expansion of the hamstrings are activated, soothing sciatic nerves, and having a beneficial outcome.[10] Accordingly, preparation systems for the sciatic nerves prescribed as a helpful strategy for patients

with constant low back because of expansion of the hamstrings and activating great outcomes that decrease oversensitivity and incitement of the sciatic nerves.[11] There are different treatments available for its management deep friction massage, soft tissue mobilization[12] and static stretching, but the use of passive, self-mobilization, stretching with Nerve mobilization was found quite better to relieve their sign and symptoms. This will help clinicians to manage pain and improve hip functions. We hypothesized if there is any significant effect of Passive with Self-Mobilization of Sciatic Nerve in patients with Piriformis Syndrome. The study aimed to determine the effectiveness of passive mobilization versus self-mobilization in managing pain and improving quality of life in patients with Piriformis syndrome.

METHODOLOGY

A quasi experimental study was conducted on n=30 subjects at Imran Idrees Hospital Sialkot. It was conducted from April to October 2019, after the approval of synopsis from Research committee of Riphah International University (RCR &AHS/REC-NMPT/S/019/014).The convenience sampling technique was used and pre-diagnosed patients having pain within lower extremity and involved hip while sitting, at least 2 months history of pain (score of more than 3 on Numeric pain rating scale), Lasegue sign (Straight leg Raise) positive, males and females in age of 30-50 years were included. While patients with any surgical history, limited range of motion of Hip with other joints, osteomyelitis of hip, hypersensitive skin, facet pathology, traumatic injury, and psychological disorders were excluded. All the participants were given the right to leave the study if they are not willing to participate. The n=30 sample size was calculated by the following formula keeping the power of study equal to 95% and level of significance equal to 5%., $n= (Z_{1-\beta} + Z_{1-\alpha/2})^2 \delta^2_{1+} \delta^2_2) / (\mu_1 - \mu_2)^{2,}$ where desired power of the study = β =95%, desired Level of Significance = α = 5%.

The assessment was carried for 42 patients using , Lasegue test which was used for lower lumbosacral nerve root irritation as it has high sensitivity (0.80-0.97) but has low specificity (about 0.4) as the test was also found to be positive in other cases too.[13] Freiberg suggested three indication for piriformis induced sciatic pain, that are; tenderness at the sciatic notch, positive Lasegue (straight leg raise) sign and improvement with nonsurgical treatment.[14] The visual analogue scale was used to assess the intensity of pain and participants selected a number from 0-10 describing their pain intensity.[15] International Hip Outcome Tool (IHOT) was used for the hip functioning. Test-retest reliability showed that Pearson correlations were greater than 0.80 for 33 of the 60 questions. The intra-class correlation statistic was 0.78 and the Cronbach α was .99. Face validity and content validity were ensured during development, and construct validity was shown with a correlation of 0.81 to the Non-Arthritic Hip Score.

A total of 42 participants were evaluated following inclusion criteria, where n=6 declined to participate. So 36 were allocated in two groups each, with n=18 in each group (consort flow diagram is attached). Before the start of treatment all the subjects were assessed at the baseline data and pain was assessed during straight leg raise through the VAS scale on the involved side. International Hip Outcome Tool (IHOT) was used to measure for hip functioning.

Passive neural mobilization for the time of nearly 12-15 min withholding for 30 seconds and then adding 1 min rest and Leg was raised passing 35 degrees for dural motion. The sciatic nerve fully stretched at 70 degrees, while pain after that point is usually from origin of hip, sacroiliac, or lumbar spine joints related to its origin. The one sided leg raise in straightening will cause traction on the sciatic nerve, as well as dura matter.[16] Adverse tension in nerves generates signs and symptoms from the Piriformis muscle (buttocks area) traveling into the sciatic nerve distribution. Hip adduction was added with Straight leg Raise for additional traction proximal to the sciatic nerve. The average session of treatment was 30-35 minutes.

Self-Mobilization treatment was also given to group and was asked to do the same manoeuvre as applied in the passive group. The self-mobilization was given mobilization of the sciatic nerve by themselves with conventional physical therapy included phonophoresis with an Intensity of 1.5 watts /cm^2 for 10 minutes and hot fomentation for 10 minutes. Pain and IHOT were recorded at baseline, after 1st, 2nd, 3rd, and 4th week for pain and hip functioning.

The data was entered in SPSS V.21.for the analysis. The participants demographic were presented in frequency tables. The normality test Shapir-Wilk's test was used data distribution, based on

approximate normal distribution parametric tests repeated measurement ANOVA was used for within group mean and independent sample t-test for between the groups for mean differences was used at significance p≤0.05 (95%CI)

RESULTS

The mean age of participants in self-mobilization was 41.20 ±5.79 and passive mobilization was 42.87 ±4.82. Out of 30 participants, 17(56.66%) were male and 13(43.33%) were females participants. Repeated Measurement ANOVA was used for comparison of IHOT and Pain score. The mean of pain at baseline 4.86± 1.30 and reduced to 2.06 ± 1.09 after 4 weeks of passive mobilization mean difference. The mean difference was 1.13 at baseline to 3.93 after 4 weeks of passive Mobilization with p<0.05. The similarly a hip function at baseline was 131.73 ± 22.59 and improved to 232 ±19.39 after 4 weeks of Passive sciatic nerve mobilization. The results showed that neural mobilization were effective in reduction of pain and improving hip outcomes in patients with piriformis syndrome with p<0.05. (Table **2).**

Table 2.Within comparison (Pain and IHOT)

Variables	Study Group	Duration	Mean ±SD	MD	p-value
Pain Rating	Passive Mobilization	Baseline	4.86± 1.30	1.13*	0.16[a]
		2nd week	4.13 ± 1.64	1.86*	0.00[b]
		3rd week	3.13± 1.12	2.86*	0.00[c]
		4th week	2.06 ± 1.09	3.93*	0.00[d]
	Self-Mobilization	Baseline	4.67± 1.39,	.46*	0.13[a]
		2nd week	4.66 ± 1.40	.66*	0.00[b]
		3rd week	3.86 ± 1.50	1.26*	0.00[c]
		4th week	3.33± 1.17	1.80*	0.00[d]
IHOT	Passive Mobilization	Baseline	131.73 ± 22.59	-11.33*	0.04[a]
		2nd week	145.2 ± 22.82	-37.86*	0.00[b]
		3rd week	202.26 ± 23.06	-68.40*	0.00[c]
		4th week	232.00 ± 19.39	-98.13*	0.00[d]
	Self-Mobilization	Baseline	138.4 ± 43.40	-2.80	0.65[a]
		2nd week	150.60 ± 44.90	-15.06*	0.00[b]
		3rd week	165.86 ± 38.90	-30.26*	0.00[c]
		4th week	176.86 ± 36.02	-41.26*	0.00[d]

[a]Baseline vs 2nd week, [b]2ndweek vs 3rd week, [c]3rd week vs 4th week, [a] Baseline vs 4th week
Significance Level: p<0.05, p<0.01**, p<0.001****

Table 3: Between the group comparison (Pain and IHOT)

Variables	Duration	Passive Mobilization	Self-Mobilization	Mean Difference	p-Value
		Mean± SD	Mean ±SD		
Pain Rating	Baseline	4.86± 1.30	4.67± 1.39	0.20	0.13
	2nd week	4.13 ± 1.64	4.66 ± 1.40	-.33	.00
	3rd week	3.13± 1.12	3.86 ± 1.50	-.73	.00
	4th week	2.06 ± 1.09	3.33± 1.17	-1.26	.00
IHOT	Baseline	145.2 ± 22.82	138.4 ± 43.40	6.80	0.89
	2nd week	131.73 ± 22.59	150.60 ± 44.90	21.06	.00
	3rd week	202.26 ± 23.06	165.86 ± 38.90	36.40	.00
	4th week	232.00 ± 19.39	176.86 ± 36.02	55.13	.00

Significance Level: p<0.05, p<0.01**, p<0.001****

Between the groups comparison of pain at baseline P=0.13 showing pre experimental equivalence but after 4 weeks the statistically significant difference at p =.00. Similarly hip functions showed p value >0.89 at baseline but after 4 weeks of Sciatic nerve mobilization that a statistically significant difference at P =0.00,showing that both techniques were effective in reduction of pain and improving Hip functions but passive mobilization was dominant over the self-mobilization.(Table 3)

DISCUSSION

This study focused on the effects of Passive Mobilization compared to self-mobilization of the sciatic nerve in patients with Piriformis syndrome for relieving pain and improving hip functions. The results of the study were quite evident in favour of the Neural Mobilization that it is an effective technique for reduction of pain and improving Hip functions at pre-test post-test p =0.00.These results in our study are in line with the findings , that neural mobilization and exercise based treatment acquires outcomes ,experimental gathering subjects than ordinary non-intrusive treatment, VAS in passive mobilization group is significant contrast with the self –mobilization.[17] Similarly the hip scoring was also improved ,hip function got better in passive mobilization group compared to self-mobilization .As the movement lead to suppression of pain receptors and exercise lead to increase in circulation which is effective in suppressing prostaglandins reduction in pain.[18]

The nerve mobilization effective in managing the lower back pain if it is caused by n Further self-assembly for therapy to increase physical capacities, according to research, self-activation can be effective for sciatica nerve compression.[19, 20] Hamstring stretches and nerve assembly are compelling mediations for patients with lower back, and nerve activation is better than hamstring extending in mitigating lower back torment of patients. In this way, both hamstring extending and nerve activation can be conveniently applied for the treatment of patients with Low back pain.[18] The current study used neural mobilization but another study stated that Neural mobilization can be more effective in combination with deep tissue masse techniques than that of alone mobilization.[21] In passive Mobilization group P value <0.05 showing a significant improvement in Hip functions and reduction of pain, showing that neural mobilization was effective in piriformis syndrome. This can be due to sciatic nerve mobilization, when used in conjunction with other preparation procedures, may aid in the recovery of sensitive tissues by revitalizing sensory system elements to flexibility and decrease affectability, as well as reducing sciatic nerve compression.[22] With the advancement and technology improvement, Instrument assisted soft tissue mobilization can be integrated with stretching exercise as it has short rehabilitation time.[23] But another study has stated that stretching exercise can also be combined with deep friction massage for its management which is more effective for improving pain and functional index in piriformis syndrome.[24] We have used neural mobilization, which is sciatic nerve stretching compared self-stretching ,significant improvement in outcomes were seen ,stating that supervised or passive stretching is more beneficial compared to self-stretching as the proper alignment during the stretch is considerable factor. The current study has shown that piriformis syndrome can managed with passive as well self-mobilization, but passive mobilization is a supervised method with proper stretch on targeted area, which proved to be more effective than self-mobilization. This was in line with another study in favour of stretching compared to soft tissue mobilization in piriformis syndrome leading to reduction of pain.[25]

The groups comparison of pain and hip functions showed p value >0.89 at baseline but after 4 weeks of passive Sciatic nerve mobilization that a statistically significant difference at P =0.00 showing that both techniques were effective but passive mobilization was superior to self-mobilization. We have concluded that with the neural mobilization compared to other conservative management is dominant for improving functions and reduction of pain symptoms,[26] but the current study stated that neural mobilization is effective but favours passive mobilization on self-mobilization.

Limitations of the present study include small sample size and a narrow age range. Also, the follow-up of the patients was recorded so it could not be established that whether the effects continued to be the same or not. So it is recommended that further studies should be conducted with a large number of patients with a wide age range and to determine the long term effects of treatment.

CONCLUSION

The current study concluded that passive nerve mobilization is effective in pain reduction and improvement in Hip functions among patients with Piriformis syndrome compared to self-stretching with statistically significant effects.

REFERENCES

1. Pande A, Gopinath RA, Ali S, Adithyan R, Pandian S, Ghosh S. Piriformis Syndrome and Variants–A Comprehensive Review on Diagnosis and Treatment. J. *Spine Surg*. 2021;8(4):7.
2. Siddiq MA, Hossain MS, Uddin MM, Jahan I, Khasru MR, Haider NM, Rasker JJ. Piriformis syndrome: a case series of 31 Bangladeshi people with literature review. Eur J Orthop Surg Traumatol. 2017;27(2):193-203. doi: 10.1007/s00590-016-1853-0.
3. Bartkowiak Z, Eliks M, Zgorzalewicz-Stachowiak M, Romanowski L. The Effects of Nerve and Tendon Gliding Exercises Combined with Low-level Laser or Ultrasound Therapy in Carpal Tunnel Syndrome. Indian J Orthop. 2019;53(2):347-352. doi: 10.4103/ortho.IJOrtho_45_17.
4. Coppieters MW, Bartholomeeusen KE, Stappaerts KH. Incorporating nerve-gliding techniques in the conservative treatment of cubital tunnel syndrome. J Manipulative Physiol Ther. 2004;27(9):560-8. doi: 10.1016/j.jmpt.2004.10.006.
5. Coppieters MW, Hough AD, Dilley A. Different nerve-gliding exercises induce different magnitudes of median nerve longitudinal excursion: an in vivo study using dynamic ultrasound imaging. J Orthop Sports Phys Ther. 2009;39(3):164-71. doi: 10.2519/jospt.2009.2913.
6. Coppieters MW, Butler DS. Do 'sliders' slide and 'tensioners' tension? An analysis of neurodynamic techniques and considerations regarding their application. Man Ther. 2008;13(3):213-21. doi: 10.1016/j.math.2006.12.008.
7. Rodríguez-Sanz D, Calvo-Lobo C, Unda-Solano F, Sanz-Corbalán I, Romero-Morales C, López-López D. Cervical Lateral Glide Neural Mobilization Is Effective in Treating Cervicobrachial Pain: A Randomized Waiting List Controlled Clinical Trial. Pain Med. 2017;18(12):2492-2503. doi: 10.1093/pm/pnx011.
8. Anikwe EE, Tella BA, Aiyegbusi AI, Chukwu SC. Influence of Nerve Flossing Technique on acute sciatica and hip range of motion. Int.J.Med.Biomed.Res. 2015;4(2):91-9.
9. Cass SP. Piriformis syndrome: a cause of nondiscogenic sciatica. Curr Sports Med Rep. 2015(1):41-4. doi: 10.1249/JSR.0000000000000110.
10. Cha HK, Cho HS, Choi JD. Effects of the nerve mobilization technique on lower limb function in patients with poststroke hemiparesis. J Phys Ther Sci. 2014;26(7):981-3. doi: 10.1589/jpts.26.981.
11. Ahmed H, Iqbal A, Anwer S, Alghadir A. Effect of modified hold-relax stretching and static stretching on hamstring muscle flexibility. J Phys Ther Sci. 2015;27(2):535-8. doi: 10.1589/jpts.27.535.
12. Mahmood T, Hafeez M, Ghauri MW, Salam A. Instrument assisted soft tissue mobilization- an emerging trend for soft tissue dysfunction. J Pak Med Assoc. 2021;71(3):977-981. doi: 10.47391/JPMA.1168.
13. Majlesi J, Togay H, Unalan H, Toprak S. The sensitivity and specificity of the Slump and the Straight Leg Raising tests in patients with lumbar disc herniation. J Clin Rheumatol. 2008(2):87-91. doi: 10.1097/RHU.0b013e31816b2f99.
14. Fishman LM, Dombi GW, Michaelsen C, Ringel S, Rozbruch J, Rosner B, Weber C. Piriformis syndrome: diagnosis, treatment, and outcome--a 10-year study. Arch Phys Med Rehabil. 2002;83(3):295-301. doi: 10.1053/apmr.2002.30622.
15. Cook C, Learman K, Showalter C, Kabbaz V, O'Halloran B. Early use of thrust manipulation versus non-thrust manipulation: a randomized clinical trial. Man Ther. 2013;18(3):191-8. doi: 10.1016/j.math.2012.08.005.
16. Magee DJ. Orthopedic physical assessment: Elsevier sci.; 2013.
17. Kutty RK, Gebrekidan HG, Lerebo WT, Gebretsadik MA. Neural mobilization a therapeutic efficacy in a piriformis syndrome model: an experimental study. Int J Physiother Res. 2014;2(3):577-83.
18. Lee JH, Kim TH. The treatment effect of hamstring stretching and nerve mobilization for patients with radicular lower back pain. J Phys Ther Sci. 2017;29(9):1578-1582. doi: 10.1589/jpts.29.1578.
19. Cassidy L, Walters A, Bubb K, Shoja MM, Tubbs RS, Loukas M. Piriformis syndrome: implications of anatomical variations, diagnostic techniques, and treatment options. Surg Radiol Anat. 2012;34(6):479-86. doi: 10.1007/s00276-012-0940-0.
20. Krause DA, Hollman JH, Krych AJ, Kalisvaart MM, Levy BA. Reliability of hip internal rotation range of motion measurement using a digital inclinometer. Knee Surg Sports Traumatol Arthrosc. 2015;23(9):2562-7. doi: 10.1007/s00167-014-3096-0.
21. Athawale VK, Jethwani D, Qureshi MdI, Dadgal R. Combined Effect of Neural Tissue Mobilization and Deep Friction Massage in Piriformis Syndrome: A Research Protocol. Indian J. Forensic Med. Toxicol.2021;15(2).
22. Jeong UC, Kim CY, Park YH, Hwang-Bo G, Nam CW. The effects of self-mobilization techniques for the sciatic nerves on physical functions and health of low back pain patients with lower limb radiating pain. J Phys Ther Sci. 2016;28(1):46-50. doi: 10.1589/jpts.28.46.
23. Mahmood T, Afzal W, Ahmad U, Arif MA, Ahmad A. Instrument soft tissue mobilization integrated with exercise for musculoskeletal disorders. Rawal Medical J. 2021;46(3):749-52.
24. Kanwal R, Khan J, Awan WA, Khan R, Malik S. Stretching exercises versus deep friction massage for the management of piriformis syndrome: soi: 21-2017/re-trjvol02iss02p65. T Rehab J 2018;2(02):65-9. doi.10.52567/trj.v2i02.29
25. Alarab A, Unver F. Stretching Exercise Versus Tissue Mobilization Technique in Piriformis Syndrome. Eur. J. Med. Healt. Sci. 2020;2(6). doi.10.24018/ejmed.2020.2.6.610
26. Kurt V, Aras O, Buker N. Comparison of conservative treatment with and without neural mobilization for patients with low back pain: A prospective, randomized clinical trial. J Back Musculoskelet Rehabil. 2020;33(6):969-975. doi: 10.3233/BMR-181241.

Disclaimer: None to declare.
Conflict of Interest: None to declare.
Funding Sources: None to declare.