

SYSTEMATIC REVIEW**TREATMENT OF SCIATICA BY NEURAL FLOSSING TECHNIQUE (NFT) IN ADULTS****ABSTRACT****BACKGROUND**

Sciatica is regarded as the most common and disabling disorder with a prevalence rate of 40% among varying inhabitants which results in an increased rate of pain and decreased or absent sensation in affected dermatomal segments due to compression of the sciatic nerve at the level of L4-S2 segmental level. Many conventional and conservative physical therapy treatment approaches have been used for its management but the effect of Neural Flossing Technique is efficient and cost-effective.

METHODS

Google Scholar, Medline (PubMed) were used for randomized trials to determine the efficacy of neural flossing in sciatica in adults was searched. The search terms were neural flossing, sciatica, treatment, adults, in different combinations. All randomized control trials were conducted with continual outcomes as end-point scores (i.e., mean and standard deviation of the variables with their follow-up and their comparison with baseline values). Ninety-five percent confidence intervals have been conducted/imposed for all outcomes. All Statistical tests were analysed at the significance level of $p<0.001$.

RESULT

A total of five RCTs was included in this review that met the inclusion criteria. The analysed results showed NFT along with conventional physiotherapy to be effective on both reducing pains [95% CI $p<0.001$] and disability [95% CI $p<0.001$] and improving hip range of motion [95% CI $p<0.001$]. The mean quality methodological score was 3.4 out of 5.

CONCLUSION

Nerve flossing technique was a significantly effective treatment regime for the management of sciatica, reducing pain along with disability, and improved better outcomes in terms of the range of motion at hip joints. The neural flossing technique combined with conventional physical therapy regimes was also effective-produced positive results.

KEYWORDS

Neural flossing, nerve, sciatica, rehabilitation.

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INTRODUCTION

Sciatica; a debilitating state also the commonest and the fifth most prevalent health problem¹. Amongst the illness categories, it evidently increases the cost of hospitalization leading to absence from work and disability¹. It is also considered as one of the most communal conditions with throbbing pain that aids in disabling conditions of the lower limb that restricts mobility². The sciatic nerve is the largest branch of sacral plexuses and also one of the thickest nerves of the lower limb³. Compression of the sciatic nerve has multi-factorial etiology; nerve irritation, inflammation, disc herniation, spinal or foraminal stenosis, hypotrophy of ligamentum flavum, osteophyte, or tumour formation are some causes resulting in compression of structures that progress into sciatica². It's the far most commonest manifestation of disc herniation, but it's not true in all cases⁴. Any kind of pain that impacts directly the sciatic nerve can be termed as sciatica⁵. All these elements play a significant role in generating neuronal tension. Adverse neuronal tension is a physiologic and/or conditioned response generated when edifices of the neuronic system exceed above their range of movements⁶. The prevalence of sciatica varies among the general and working populations³. At some point in life, about 80% of the individuals experience low back pain and among them, the incidence rate of sciatica is as high as 40%³. This acts as a ground due to which individuals are not being able to work at some point in life⁷. The broad-spectrum consensus in medicine is that the cause of sciatica comes mainly from spinal segments rather than neural segments¹. It is so because disc pathologies can create direct pressure on the sciatic nerve which in turn irritates its roots⁸. It is estimated by professionals that 66% of all sciatica comes from intervertebral disc sources. However, this estimate is still debatable as few investigators have ambiguity regarding the disco-genic issues, this does not mean that it is the only causative factor of sciatica; correlation is not causation.

Sciatica is characterized by a variety of symptoms that follows a particular dermatomal pattern of the affected nerve root. Nearly, all the disco genic originated sciatica is evoked by herniation of the lumbar disc and is accompanied by multiple neurologic deficits; such as leg pain, paraesthesia, disability, and pain in the lower back segments^{7,8}. No two episodes of sciatica pain are alike⁸. The herniation of disc is most commonly in postero-lateral direction compressing (L4-S2) segmental root⁹. On the basis of duration of resolving of symptoms, it can be classified into two subtypes: acute sciatica resolving between 4-8 weeks and chronic sciatica being persistent for a longer duration⁷. Sciatica is interchangeably used with several other terms nerve root pain, radicular pain, low back pain, nerve root entrapment, etc^{8,9}. Sciatica sufferers experience more pain and

disability and also longer duration to recover as compared to only low back pain sufferer.

Owing to the prevalence of pain and radiculopathy of the lumbosacral region, along with the measure of physiological and psychological stress it induces, there's a necessity to work out the measures that are efficacious in terms of interventions that aid in low back pain and its associated symptoms¹¹. A range of physiotherapy interventions is planned to be effective. Many conventional treatment modalities and methods are used by physiotherapists for their management.

The flossing Technique is a secure, useful, and practical conventional treatment choice for many compressive neuropathic conditions¹². Neural flossing is a synonymously used neural gliding technique or Neuro dynamic mobilization which can not only alleviate pain but can also increase the range of movement^{13,24}. It targets the nervous system concerning the length and mobility of the nerves in the peripheries, re-establishing the neural motion providing the assistances in untangling of the nerves within the tissues that creates the tension and restricting the motion^{24,25}. It has a prompt and transient impact on pain relief, restoration of sensory symptoms, and recovery of spinal adaptability. Despite that, limited evidence for the nerve flossing strategy in sciatica is available²⁴. As proposed by Michael Shacklock; NFT is a beneficial conservative available treatment, active in nature that can benefit mechanically and physiologically^{13,14}. Major objective is to identify the effectiveness of the neural flossing technique in adults by stretching the nerves and promotion actively lengthening it thereby releasing the tensions generated due to entrapment¹.

MATERIALS AND METHODS

This systematic review has "Preferred reporting items for systematic reviews and meta-analysis (PRISMA)" guidelines to obtain researches regarding.

Data Sources And Serching Stretgies:

To identify the studies with neural flossing technique trials, a literature search was conducted on different web bases including GOOGLE SCHOLAR, Pedro and MEDLINE (PubMed) with the keywords neural flossing, neural flossing in sciatica in combination for clinical trials in English.

Eligibility Criteria:

As far as the author's knowledge is concerned, all the available literature was evaluated by the title of the studies, nature of the texts (abstracts/full texts) for the assessment of quality scores. For reporting items of randomized trials (PRISMA) was used to select studies that fulfil the outcomes of neural flossing in sciatica. To implement quality assessment scores, present literature was analysed by the title of

the studies, availability of the texts. The abstracts of the randomized control trial, which evaluate the effectiveness of the neural flossing technique for the treatment of sciatica, were reviewed for eligibility criteria by the independent reviewer. Not any constraint for language restriction was retained.

Data Extraction:

After the discussion in between author, an inclusion criterion was decided. All randomized trials that include neural flossing related outcomes in sciatica were included. Adult participants with sciatic pain without neural dysfunction were considered for the inclusion. The participants must have sciatica and no other neural or neuromuscular condition, were included. All the RCT's for the management of sciatica by neural flossing of sciatic nerve are assumed to be effective for pain reduction and regain of sensation at dermatomal level of lower limb as equated to conservative physical therapy treatment were included. 6 of the studies were excluded due to poor methodology, 2 studies of them were not RCTs, 2 of studies didn't use NFT as treatment technique and remaining studies were excluded due to use of other neuromuscular condition with neural mobilization technique. Outcomes of studies included in this review are pain intensity and disability analysed by visual analogue scale VAS and numerical pain rating scale NPRS, hip range of motion by straight leg raise SLR and passive straight leg raise PSLR, bothersomeness of back and leg symptoms by Sciatica Bothersomeness Index, lumbar flexion ROM, functional disability by MODQ and Roland Morris Disability Questionnaire-Gujarati RMDQ-G and for fear belief FABQ-G were used. These all were assessed pre and post treatment. The effectiveness of NFT along with conventional physiotherapy in comparison with conventional treatment alone or along with neural mobilization was measured using these outcomes.

Risk of Biasness:

The quality of the eligible studies was assessed and risk of biasness was measured on the domains including; quality score, randomization, blinding, withdrawals and dropouts, allocation concealment and description.

Clinical Trial	Quality Score	Randomization	Blinding	Withdrawals and Dropouts	Allocation concealment	Description
Kranthi Palipamula	2	2	1	3	Yes	Sufficient
Anikwe et al.	4	2	1	2	Yes	Adequate
Darshana	2	1	1	0	Unclear	Unclear
Bhatia et al.	4	2	2	0	Yes	Adequate
Himani et al.	3	2	1	0	Yes	Adequate

Table 1: Risk of Biasness

Continuous outcomes were reported in all trials as end-point scores (i.e., baseline comparability is assumed by mean value and standard deviation value of the variables at the follow-up sessions).

RESULTS

Amongst the literature review, five clinical trials qualified for the incorporation criteria having conceivable information for consideration. All of the included studies were distributed in English. The remaining surveys did not meet the criteria after an initial review of 22 articles, five studies including 169 and 219 patients 185 from India (Kranthi 2012, Bhatia 2017, Himani 2019, Darshana 2018), 32 from Nigeria (Anikwe 2015), neural flossing technique as treatment in sciatica in adults and control groups were included summarized in Table-1.

The studies were allocated in India (n=4), Nigeria (n=1). The reviewed publications included five randomized controlled trials published from 2012 to 2019. Attendance and adherence to the treatment plan were reported accurately by all five studies. Analysing all five RCT'S included in this review; studies have both high- and low-quality scores. All studies measured the effects of NFT on the improvement of sciatica episode and hip mobility assessed by VAS and PSLR/SLR test. Final results showed NFT as significantly effective in reducing pain [95% of CI p<0.001], disability [95% of CI p<0.001], and improving hip ROM [95% CI p<0.001]. For the comparison of pre- and post-intervention changes regarding outcome measure variables in each group (A and B), a paired sample t-test was used. An independent t-test was applied for the comparison of baseline and outcome measure variables between the two groups. All Statistical tests were conducted with a significance level of 90% of p <0.05. RCTs investigated for this paper were considered heterogeneous since they reviewed a measurement of pathologies and NFT.

Clinical trial	Year of study	Country	Design	Duration	Number of patients	Age	Gender (M:F)
Kranthi	2012	India	RCT	11 months	39/87	20+55	N/A
Pallipamula Anikwe et al.	2015	Nigeria	RCT Pre-test-post-test	2 weeks	32/34		13:19
Darshana	2018	India	control RCT Pre-test-post-test	5 months	30	35-50	N/A
Bhatia et al.	2017	India	control Prospective RCT	4 weeks	38	20+40	N/A
Himani et al.	2019	India	RCT Pre-test-post-test	5 days	30	-	20:10

Table-2: Characteristics of trials included

Moreover, dropout and withdrawals of participants were in two studies; 2 participants withdrawal, one from each group (experimental and control group) due to their mismatch of office schedule and health issue (Anikwe 2015) 3 participants dropout; two from the experimental group and one from control group because their treatment plan could not be followed properly. (Kranthi 2012).

Types of treatment included: comparison of nerve flossing with conventional physiotherapy (4 studies), comparison of nerve flossing and conventional physiotherapy, and neural mobilization (1 study). Conventional physiotherapy includes; Tens and Traction in two studies with 49 participants; 36 for the

exercise group and 36 for the control group, Cryotherapy, Soft Tissue Manipulation, Reverse straight leg raise withhold and relax, High frequency (TENS) to of the body with 32 participants; 16 for exercise group and 16 for the control group, therapeutic exercises in one studies with 38 participants; 19 for exercise group and 19 control group, one study reported Cryotherapy, Knee to chest exercises, Back strengthening exercises and ergonomic advice with 30 participants; 15 for

exercise group and 15 for control group along with neural mobilization.

The time period for the treatment plan varies from 11 months to two weeks in two respected studies (Kranthi 2012), (Anikwe 2015). The third study continued its treatment plan for 5 months (Darshana 2018) and the fourth study for four weeks (Bhatia 2017). And the last study took 5 consecutive days for treatment (Himani 2019).

Clinical Trial	Intervention	Parameters	Pre-Treatment Score	Post-Treatment Score
Kranthi	NFT combined with (TENS &	Visual Analog Score (VAS),	7.01 ± 1.10	1.39 ±0.59
Pallipamula	Traction)	Sciatica Bothersomeness Index,		
	Control Group: TENS &	(PSLR),	13.53 ±2.17	2.37 ±1.12
	Traction	Active lumbar flexion range. Modified Oswestry Disability Questionnaire (MODQ) score.	45.21 ±6.89	72.32 ±4.16
			4.85 ±0.65	7.35 ±0.58
			39.13 ±10.70	30.13 ±6.85
Anikwe et al.	Cryotherapy (LB), Soft Tissue (stroking and effleurage),	Passive Straight Leg Raise (range of motion of hip flexion)	45.00 ±5.54	71.13 ±3.67
	Manipulation on pain areas,	Numeric Pain Rating Scale		
	Reverse SLR, High frequency (100Hz) TENS, NFT	score	8.56 ±1.09	1.81 ±1.60
	Control Group: conventional physiotherapy NFT + Tens followed by	Visual analogue scale (VAS)	7.6±	2.26 ±
Darshana	Traction Control Group: Conventional Physiotherapy	Straight Leg Raise (SLR).	48 ±	61 ±
Bhatia et al.	NFT + conventional physiotherapy	Numerical pain rating scale PSLR Roland Morris Disability	7.63 ± 44.47 ±	1.16 ± 71.21 ±
	Control Group: Therapeutic exercises	Questionnaire Fear avoidance beliefs		
		questionnaire 15.79 ±	2.68 ±	15.32 ±
Himani et al.	NFT+ conventional therapy + cryotherapy	Numerical Pain Rating Scale (NPRS)	6.4 ±	5.8±
	Exercises	Passive Straight Leg Raise	47.2 ±	49.6 ±
	(Knee to chest, abdominal	(PSLR)		
crunches, back strengthening)				
Ergonomic advice				
Control Group: Neural				
Mobilization Technique +				
conventional therapy				

Table-3: Description of Studies

All the studies reported different frequencies of sessions; two studies reported two consecutive days, another study reported the frequency of thrice/week for two weeks, and five days/week were revealed in other studies.

In all five studies, controls were divided into conventional physiotherapy (Kranthi 2012, Anikwe 2015, Bhatia 2017, Himani 2019, Darshana 2018).

DISCUSSION

A pursuit of randomized trial control on neural flossing techniques brings forth only 5 studies that reach up inclusion criteria for this review.

Nerve flossing can be utilized with physiotherapy modalities for treatment to relieve pain and sensory symptoms like tingling¹. Patients may have prolapsed or extruded intervertebral disk and sciatic impingement causing activity limitation⁵. There are diverse pressure-relieving protocols that enable intraneuronal drainage, reduce adhesiveness and symptoms while sustaining nerve tension, and also lower ischemic discomfort^{9,15}. An author reported improvement in pain and hip range of motion post 2 weeks of an NFT in acute sciatica due to IVDP. It might even be directly related to the immobilization reduction within the neurogenic inflammation^{1,5,8}. Similarly study Darashana D et al suggested that there is a clinical indication for NFT to improve spinal ROM for patients with neurology¹¹. Ergonomics rehabilitations along with nerve flossing technique provide a short-run improvement in pain, sensory symptoms, neural mobilizations, lower back muscles strengthening, and improvement in hip range of motion^{11,17}.

Methodological inadequacies will contribute to underrating outcomes. For example, Blinding significantly decreases bias and confounding, associated with importance in maintaining the strength of an RCT. Blinding in studies involving conventional therapy^{1,3}. NFT combined with conventional Physiotherapy protocol¹¹. The clinical intervention criteria are, application of TENS in combination with NFT to improve dynamic spectrum for the hip range of motion¹. The mixture implication of NFT with cryotherapy was a stronger treatments choice within the executing of participants having reduced hip range of motion following neurogenic inflammation. In cases of sciatica with sub-acute LBP and lumbar/lower quadrant flexibility in male soccer players, conventional physiotherapy was far more beneficial in the Straight Leg Raise (SLR) range^{8,11}. This intervention has also improved effects in the condition of cervicobrachial neurogenic pain for the better outcomes of elbow movements. In two studies NFT ought to be combined with conventional therapy²⁰. The outcome measures utilized the RCTs during this review with additional homogeneity. Future researches are needed and a larger, more complete body of work is needed before conclusive evidence is available. In all 5 studies, neural stretches have a binomial impact and have also reduced psychological stress, improved mobility, and flexibility along with reducing pain^{1,3,8}.

This technique also helps in improving neuromuscular function by enhancing ROM, reducing inflammation and pain to normalize nerve functions and sensory perception⁵.

Three core physical therapy treatment methodologies include stretching of muscles/nerves, mobilization of joint structures and lastly strengthening of the muscles of the affected segment(s)^{7,11}. Conventional physical therapy works in conjunction with the core attributes along with the modalities to improve the efficacy of the treatment plan⁵. At times it is also used as solitary contrary to assess the efficacy of relative treatment approaches and at times as a placebo. The count of studies has analysed the effects of; TENS, neural flossing, cryotherapy along with manual traction, soft tissue mobilization, exercises, and strengthening practices as a treatment preference¹. The treatment approaches of the included studies regardless of the evidence and treatment indications showed immense progress in relieving the symptoms and contributing towards better and active participation in daily activities^{8,11}.

Electrical stimulations and cryotherapy have now become a go therapy approach that not only eliminates the pain but aid in restoring the muscular functions and restoration of the activities^{11,20}.

The neural flossing technique has not only shown improvement in the range of movements but also helped in reducing pain and disability of the spinal segments in the sciatica-affected population^{1,3,8}. It also did astonishments if used in acute sciatica to alleviate the symptom when applied in conjunction with conventional physical therapy methodologies^{8,11,17}.

As the modality and treatment approaches differ from population to population, condition to condition, activity status, and at times also upon the availability of the equipment in the settings, the foremost objective of the physical therapist is always to achieve long-lasting results that not only benefit the individual's well-being but also contribute in attaining the confidence of the patient so that a long-term relationship can be achieved¹.

CONCLUSION

The nerve flossing technique was found to be incredibly effective at treating sciatica, relieving pain, and decreasing disability even while expanding the range of motion at the hip. The NFT combined with traditional physiotherapy was also beneficial and generated positive outcomes.

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