

Immediate Effect of Strain-Counterstrain Technique vs Myofascial Release on Pain Among Tertiary Care Nurses with Plantar Fasciitis - A Comparative Study

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ABSTRACT

Background: Plantar fasciitis, a common cause of heel pain, significantly impacts the daily activities of healthcare professionals, particularly nurses who engage in prolonged weight-bearing activities. This study compares the immediate effects of the Strain-Counterstrain (SCS) technique and Myofascial Release (MFR) on pain relief among tertiary care nurses with plantar fasciitis.

Methods: A total of 40 tertiary care nurses with clinically diagnosed plantar fasciitis were randomly assigned to two intervention groups: Group A (n=20) received SCS treatment, and Group B (n=20) received MFR treatment. Pain intensity was measured using the Numerical Pain Rating Scale (NPRS) before and after the intervention. Data were analyzed using paired and unpaired t-tests to compare intra-group and inter-group differences.

Results: Both SCS and MFR techniques resulted in significant pain reduction. The SCS group showed a mean NPRS decrease from 5.00 ± 1.08 to 2.20 ± 0.62 ($p < 0.0001$), while the MFR group showed a decrease from 4.95 ± 1.02 to 3.70 ± 1.05 ($p < 0.0001$). Inter-group comparison indicated a more significant pain reduction in the SCS group ($p < 0.0001$).

Conclusion: The Strain-Counterstrain technique is more effective than Myofascial Release in providing immediate pain relief among tertiary care nurses with plantar fasciitis. This finding supports the incorporation of SCS in the clinical management of plantar fasciitis for rapid pain alleviation.

Keywords: Myofascial Release, Pain Management, Plantar Fasciitis, Strain-Counterstrain, Tertiary Care Nurses

INTRODUCTION

The plantar fascia is dense, fibrous connective tissue structure originating from the medial tuberosity of the calcaneus. From its origin at the calcaneal tubercle, the plantar fascia extends distally and attaches to the MTP joints and base of toes. It is functionally divided into medial, central and lateral bands. The fascia covers the intrinsic musculature and neurovascular anatomy of the plantar foot¹.

The risk of plantar fasciitis between 2006 and 2012 was compared between physicians and general population, between nurses and general population, and between physicians and nurses and also compared the risk of plantar fasciitis among physician subgroups⁴. The risk of plantar fasciitis was higher among nurses in the subgroups of age <35 yr

and female population.²⁴ Physicians and nurses had a period prevalence of plantar fasciitis of 8.14% and 13.11% during the 7-year period, respectively. The risk of plantar fasciitis was lower among physicians (odds ratio [OR]: 0.660; 95% confidence interval [CI]: 0.622-0.699) but higher among nurses (OR: 1.035; 95% CI: 1.011-1.059) compared with that in the general population. Nurses also had a higher risk than the physicians after adjusting for age and sex (adjusted odds ratio [AOR]: 1.541; 95% CI: 1.399-1.701)⁴ Plantar fasciitis is a progressive degenerative disorder of the plantar fascia of the foot. It is classified as a syndrome that results from repeated trauma to the plantar fascia resulting pain and dysfunction can often become a source of frustration to both the patient and clinician. Plantar fasciitis is considered an overuse injury, and as such, the patient's history will typically reveal some combination of either extrinsic and intrinsic factors that contributed to the development of the injury. Extrinsic factors suggested in the literature include training on unyielding surfaces, and improper or excessively worn foot-wear. Intrinsic factors have included such elements as obesity, foot structure, reduced plantar flexion strength and reduced flexibility of the plantar flexor muscle and torsional malalignment of the lower extremity. The factor implicated most often as a cause of plantar fasciitis is excessive pronation of the foot. Between 81 and 86% of individuals with symptoms consistent with plantar fasciitis have been classified on examination as having excessive pronation. The theoretical basis for this finding is the increased tension placed on the plantar fascia as a result of the arch lowering during standing and walking. Cavus feet, however, have also been implicated because of their inability to effectively dissipate tensile forces during weight-bearing activities². This factors would create pathologic overload over the calcaneal insertion of the plantar fascia ,causing microtears in the fascia that may eventually lead to perifascial oedema and increased heel pad thickness .heel pad thickening would further increases

the inflexibility of the posterior structures of the foot, resulting in disruption of of the normal biomechanics of the foot had leads to decreased efficiency of force absorption, this decrease in force absorption would consequently leads to overloading of plantar fascia and increase the degenerative changes⁴ Plantar fasciitis is the most common cause of heel pain. Approximately 15% of all foot complaints coming to the attention of health-care professionals can be attributed to this cause. It is attributed to chronic weight bearing and repeated overload of the foot in daily activities or sports³. The plantar fascia is an important static support for longitudinal arch of foot. Strain on longitudinal arch of foot. Strain on the longitudinal arch exerts its maximal pull of the plantar fascia especially its origin on medial process of calcaneal tuberosity. the plantar fascia elongates with increased loads to act as a shock absorber, but its ability to elongate is limited (especially with decreasing elasticity common with age)¹

The occurrence of plantar fasciitis is usually associated with work-related prolonged weight bearing, which is like an everyday thing in nurses. Due to this hectic work, nurses are very much prone to get plantar fasciitis. However, very few researches focus on the differences between male and female nurses affected by the same. The need of this research is to find out the prevalence of plantar fasciitis in nurses and also to correlate the presence of plantar fasciitis among males and females. A cross sectional study conducted by Komal Santosh Bhoir et. Al (2021) on Prevalence of Plantar Fasciitis Among Nurses at a Tertiary Care Centre in a Rural Area which concluded that out of 100 participants 21% tested positive; out of which 17% females and 4% males⁹

In Females plantar fasciitis is mostly due to lower plantar fascia and heel fat pad thickness compared with males. Foot Structure in Women often have different foot anatomy, such as a higher arch, which can increase strain on the plantar fascia. Hormonal fluctuations, especially during pregnancy, can affect ligaments and foot

mechanics. Women tend to wear heels and less supportive shoes, which can exacerbate foot issues.

On examination, there is tenderness over the medial side of the calcaneum. It is characterized by pain at the insertion of the plantar fascia. Diagnosis is based on the patient history and on the result of the physical examination. The patient typically presents with inferior heel pain on weight bearing. Pain associated with plantar fasciitis may be throbbing, searing, or piercing, especially with the first few steps in the morning or after periods of inactivity⁵.

The weight-bearing Windlass test (ICC-0.99). This test involves passive extension of the first metatarsophalangeal joint in standing position to cause a Windlass effect of the plantar fascia. Reproduction of heel pain is a positive sign⁶

Planter fasciitis is usually treated conservatively, Conservative treatment is almost always successful, most patients respond and are better within 9 months of physiotherapy treatment⁵. strain-counter strain is a type of "passive positional release" created in the early 1960s by muscle Lawrence Jones, D.O. It is a hands-on treatment that attempts to alleviate and connective tissue tightness by the use of very specific treatment positions held for 90 seconds⁷

Myofascial release (MFR) is a soft tissue mobilization technique used for chronic conditions that cause tightness and restriction in soft tissues. Myofascial release technique leads to change in the viscosity of the ground substance to a more fluid state, thus eliminating the fascia's excessive pressure on the pain sensitive structure and restores proper alignment. Hence this technique is proposed to act as a catalyst in the resolution of Plantar fasciitis⁸

Thus, this study intends to compare the immediate effect of Strain counter strain and myofascial release in subjects with plantar fasciitis.

MATERIALS & METHODS

MATERIALS

1. Consent form
2. Pen
3. Paper
4. Pillows
5. treatment couch
6. stopwatch
7. stool

METHODOLOGY

1. Study Design – Comparative study
2. Study Set up – Dr. Ulhas Patil College Of Physiotherapy, Jalgaon
3. Study Duration – 6 months
4. Target Population- Tertiary health care nurses
5. Sample Size – 40

Minimum sample size (N)- To test population mean

$$n = \frac{Z1^2 S^2}{d^2}$$

M	Your guess of Population M	28.43
S	Standard deviation of M	6.39
1- α	Set level of confidence (value < 1.0)	0.95
Z1	Z value associated with confidence	1.96
d	Absolute precision	2.00
n	Minimum sample size	40

6. Method of Sampling – Simple random sampling using lottery method
7. Selection Criteria –

• Inclusion criteria -

1. Age group 20 to 35 years.
2. Participants willing to participate in the study.
3. Clinically diagnosed cases of plantar fasciitis
4. Subject with pain in plantar fascia.
5. Both gender
6. Subjects with BMI (18.4 to 24.9)

• Exclusion criteria -

1. Subject who is not willing to participate.
2. Infections or open wounds in the affected foot or lower limb.
3. Foot or lower limb injuries, neuropathy, or systemic inflammatory conditions.

4. Pregnant women.
5. Subjects who received Corticosteroid injection in heel preceding 3 months were excluded from study.
6. Obese subjects.
7. Severe pain & tenderness i.e. (NPRS ≥ 7) on palpation.

PROCEDURE

Ethical clearance was obtained from Institutional Ethical Committee & Principal of Dr. Ulhas patil college of physiotherapy. A written informed consent form was obtained from subjects who are willing to participate. Subject was screened according to inclusion and exclusion criteria. The aim of the study and its objective is explained to willing participants. Selected participants demographics details outcome measures is recorded. Screening was conducted according to diagnostic criteria. Pre-measurement of all outcome measures were taken then patient was randomly divided in to either of the two groups – Group A(n=20) receive strain counter-strain and Group B

(n=20) receive myofascial release using simple random sampling (lottery method).

INTERVENTION

STRAIN-COUNTERSTRAIN (GROUP A) -

- With patient in prone position, ipsilateral knee flexed, the practitioner places one thumb on the tender point at the plantar fascia insertion.
- While monitoring the tender point with the thumb, the toes and ankle are plantar flexed, curving around the tender point until symptomatic relief of the tenderness is felt by the monitoring thumb.
- If required, supination or pronation of the foot can be added.
- The position of ease is held for approximately 90 seconds or until there is softening of the tissues below the monitoring thumb.
- The foot is then returned to neutral position without moving the thumb and the tender point re-assessed.



Figure 1: Strain-Counterstrain

MYOFASCIAL RELEASE (GROUP B) -

- The patient in supine with the therapist at the foot end of the couch.
- The therapist uses a closed fist to contact the sole of the patient's foot just proximal to the metatarsal heads.
- While applying pressure to the plantar aspect of the foot, the therapist positions the foot into dorsiflexion & toe extension.
- Then the therapist drags his fist over the plantar fascia contacting the restricted layer and applies pressure in the length of the fascia maintaining the same pressure throughout and then releases it.

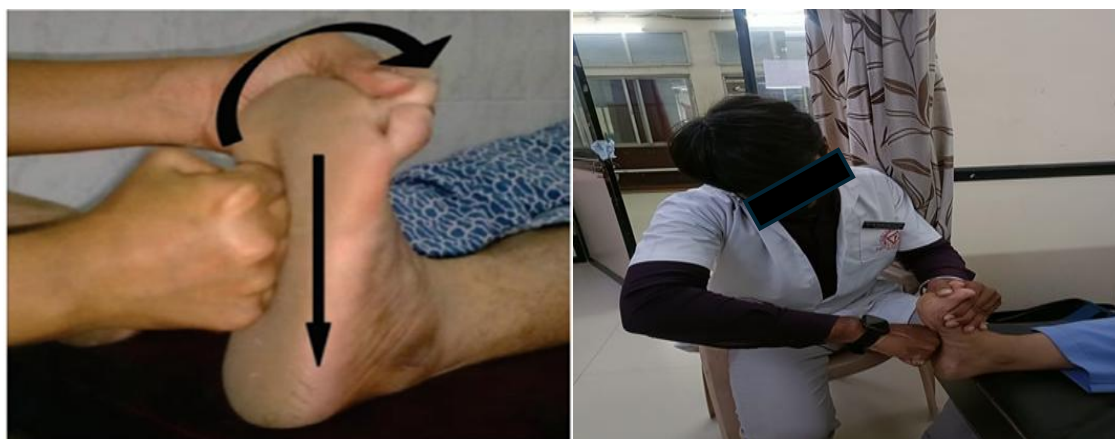


Figure 2: MYOFASCIAL RELEASE

STATISTICAL ANALYSIS

The data was collected, analyzed and was entered in excel sheet and statistical analysis was done using InStat 3.05 software. The statistical analysis was done using paired and unpaired t-test. Paired t-test was used for statistical analysis to compare pre and post intervention values within groups. The unpaired t-test was used for between groups statistical analysis to compare mean values of pre & post intervention values of both the groups. Statistical significance was set at $p \leq 0.05$

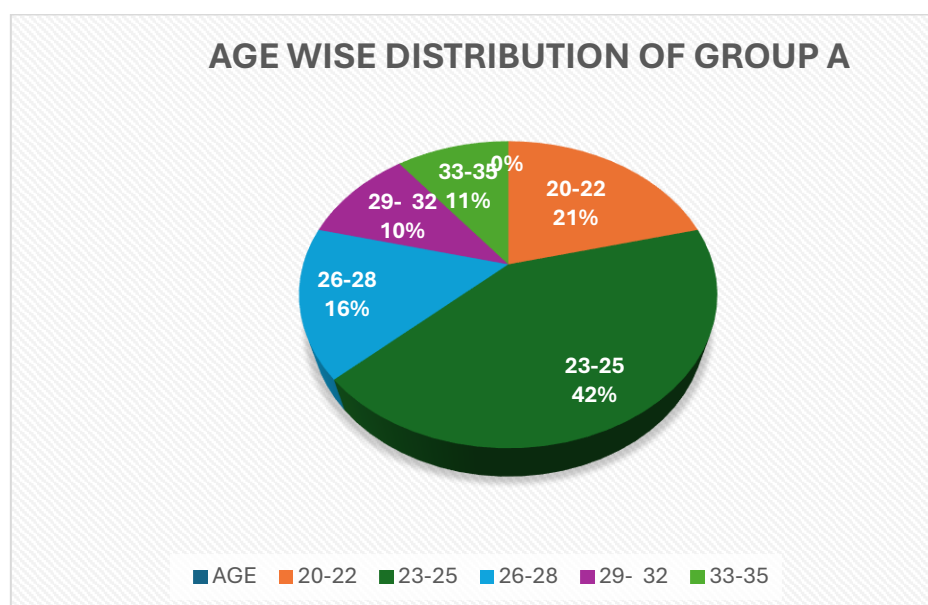
RESULT

The present study included 40 subjects with tertiary care nurses with plantar fasciitis who

met the inclusion criteria. The subjects were equally divided into two groups by simple random sampling using lottery method. Group A and Group B both consisted of 40 subjects. Group A received Strain-Counterstrain technique and Group B received Myofascial Release for Plantar fasciitis.

Table 1) Age wise distribution of Group A (Strain- Counter-strain):

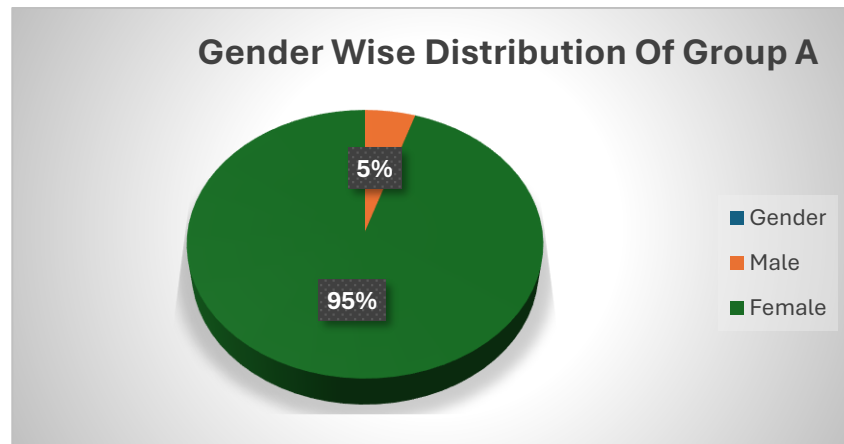
Age group	FREQUENCY	PERCENTAGE
20-22	4	21%
23-25	8	42%
26-28	3	16%
29-32	2	10%
33-35	2	11%



COMMENT – The pie diagram shows the age wise distribution of study subjects. There were 4 subjects between 20 to 22 years of age, 8 subjects from 23 -25 years of age, 3 subjects from 26-28 years of age, 2 subjects from 29-32 years of age & 2 subjects from 33-35 years of age.

Table 2) Gender wise distribution of Group A (strain-counter-strain):

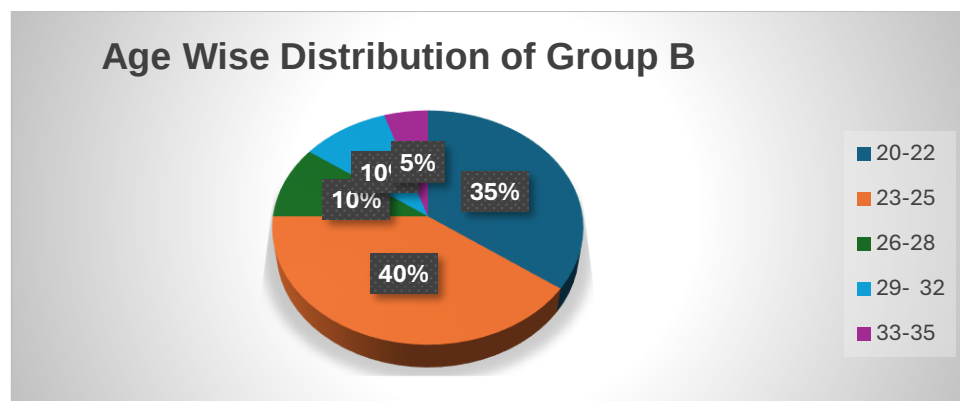
Gender	Total subjects(n=20)	
	n	Percentage
Female	19	95%
Male	1	5%



COMMENT -The pie diagram shows the gender wise distribution of study subjects. There were 95% subjects are females & 5% subjects are males.

Table 3) Age wise distribution of Group B(MFR) :

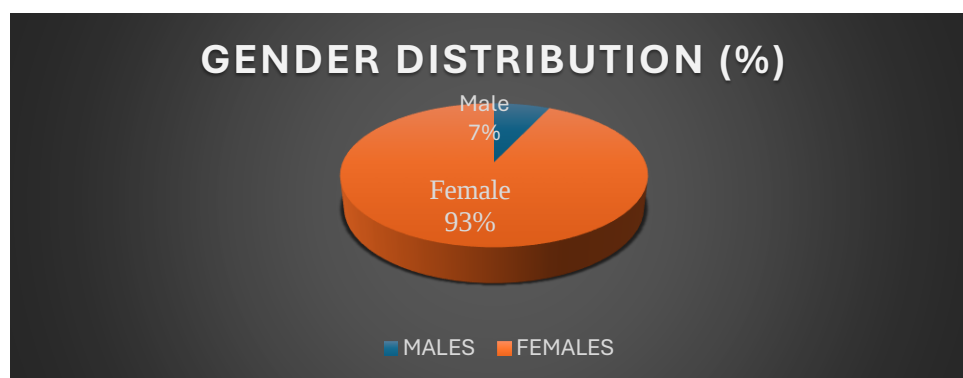
Age group	FREQUENCY	PERCENTAGE
20-22	7	21%
23-25	8	42%
26-28	2	16%
29-32	2	10%
33-35	1	11%



COMMENT – The pie diagram shows the age wise distribution of study subjects. There were 4 subjects between 20 to 22 years of age, 8 subjects from 23 -25 years of age, 3 subjects from 26-28 years of age, 2 subjects from 29-32 years of age & 2 subjects from 33-35 years of age

Table 4) gender distribution of Group B(MFR):

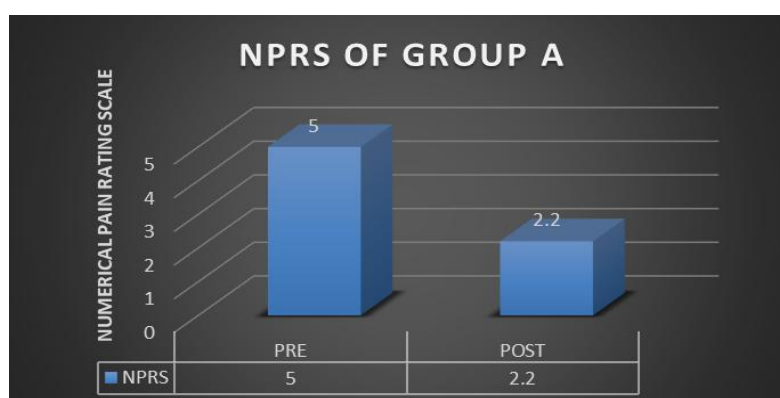
Gender	Total subjects(n=20)	
	n	Percentage
Female	18	93%
Male	2	7%



COMMENT -The pie diagram shows the gender wise distribution of study subjects. There were 97% subjects are females & 7% subjects are males.

Table 5). Intra group Comparison of NPRS of Group A(SCS)-

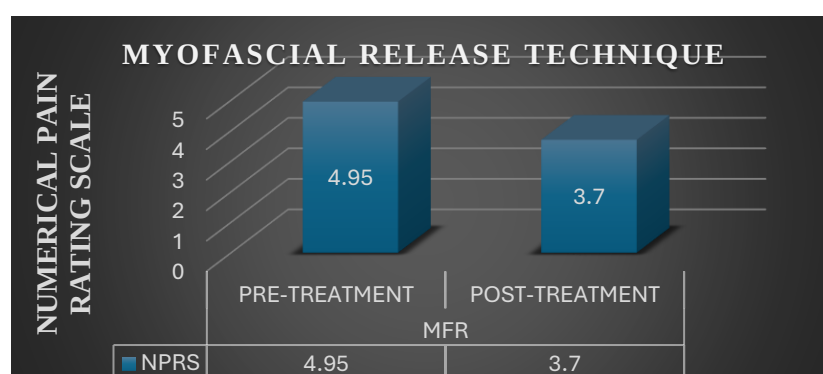
Test	N	Mean	Mean difference	SD	t-value	p-value	Level of Significance
PRE	20	5.000	2.800	1.076±0.6156	9.473	<0.0001	Extremely significant
POST		2.200					



COMMENTS - Intra group comparison of pre and post data value of NPRS in group A. The pre data of NPRS mean is 5.000 with SD 1.076; when it is compared with post mean 2.200 with SD 0.6156, the obtained p value is < 0.0001 which represents there is extremely significant improvement in pain intensity after intervention (table 3 and graph 3).

Table 6) - Intra group Comparison of NPRS of Group B(MFR)-

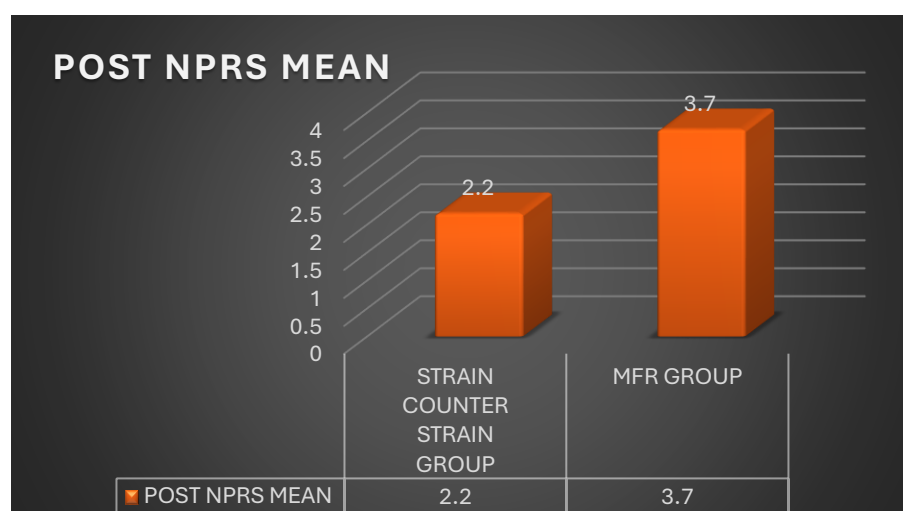
Test	N	Mean	Mean difference	SD	t-value	p-value	Level of Significance
PRE	20	4.950	1.250	1.023±1.053	2.100	<0.0001	Extremely significant
POST		3.700					



COMMENTS - Intra group comparison of pre and post data value of NPRS in group B. The pre data of NPRS mean is 5.000 with SD 1.076; when it is compared with post mean 2.200 with SD 0.6156, the obtained p value is < 0.0001 which represents there is extremely significant improvement in pain intensity after intervention (table 3 and graph 3).

Table 7)- Inter Group Comparison of NPRS Between Group A (Strain-Counterstrain) And Group B(MFR)-

Group	N	Post NPRS Mean	Post NPRS Mean difference	SD	t-value	p-value	Level of Significance
A	20	2.200	1.700	0.6±1.05	2.028	<0.0001	Extremely significant
B	20	3.700					



COMMENTS - Inter group comparison of post -post data value of NPRS. The post mean value of group A and B are 2.200 and 3.7, post sd value of group A and B 0.6±1.05. The obtained p value is < 0.0001 which represents there is extremely significant difference

DISCUSSION

This study was designed to compare the Immediate effect of Strain-Counterstrain and Myofascial Release on pain in Tertiary care nurses with Plantar Fasciitis. This study proved the efficacy of Strain-Counterstrain and Myofascial Release by reducing pain intensity in plantar fasciitis. In comparison of both these technique for their effectiveness, it was found that Strain-Counterstrain is more effective than the Myofascial Release in reducing pain in Tertiary care nurses with plantar fasciitis.

The mean age of subject in group A (Strain-Counterstrain) & group B (myofascial release) were 25.56±7.218 years and 24.25±4.789 years respectively with p-value of 0.2514 which indicates that there was no significant difference in the age group of subjects between the groups.

the demographic distribution of the participants showed a predominance of female nurses, which is consistent with the gender ratio commonly seen in nursing professions. The average age of participants also aligns with the typical age group of

active nursing professionals, suggesting that the results are applicable to a relevant population in a healthcare setting. The study highlights that both techniques can be implemented in clinical practice to manage pain effectively in healthcare workers suffering from plantar fasciitis, a condition that can severely impact their work performance and quality of life²⁰.

In this study the results demonstrated the efficacy of both techniques in reducing pain intensity, with Strain-Counterstrain proving to be more effective than Myofascial Release. The mean pain intensity score for the Strain-Counterstrain group showed a significant reduction from 5.000 ± 1.076 pre-intervention to 2.200±0.6156 post-intervention, with a p-value <0.0001, indicating extremely significant improvement in pain intensity. In contrast, the Myofascial Release group had a pre-intervention mean score of 4.950 ± 1.023, which decreased to 3.700 ± 1.05 post-intervention, with a p-value of < 0.0001 as well, showing significant improvement but less effective than Strain-Counterstrain.

When comparing between group the study was statistically extremely significant which shows Strain-Counterstrain is more effective than Myofascial release technique in patients with Plantar fasciitis. Hence, study accepts the alternative hypothesis.

The significant reduction in pain after the Strain-Counterstrain technique can be explained by its focus on the neuromuscular system and its ability to reset the muscle spindle activity, thereby reducing muscle tension and pain perception. This is supported by the findings of McKenzie and May, who demonstrated that the SCS technique can lead to immediate pain relief by correcting muscle imbalances and addressing the underlying issues causing discomfort.¹⁸

Myofascial Release technique, while also effective, typically requires more time to yield its full benefits. Studies have shown that MFR can promote increased blood flow and tissue relaxation, which may lead to longer-term relief but may not provide the immediate effects seen with Strain-Counterstrain. This delay in efficacy could be attributed to the time needed for fascial tissues to respond to sustained pressure and stretching.¹⁹

These findings are consistent with previous research, such as studies by Ümit Sıgılan and Serpil Çolak (2022), which demonstrated that Myofascial Release is effective in reducing pain and improving function, albeit over a longer period. The immediate relief seen with Strain-Counterstrain makes it a suitable option for tertiary care nurses, who often require quick pain relief to continue their demanding job roles. MFR may be more beneficial for long-term management or for addressing chronic fascial restrictions, but the faster action of SCS highlights its advantage for acute care.²¹

In our study we found that Strain-Counterstrain is more effective than myofascial release. This could be due to The SCS technique, which focuses on positioning the body in a way that reduces pain by decreasing muscle and fascial tension, has been shown to provide rapid pain relief by

interrupting the pain-spasm cycle. This mechanism is consistent with previous studies that highlight the ability of SCS to reduce hypertonicity and restore normal muscle function by addressing positional faults.⁷ The reduction in pain following SCS observed in our study mirrors findings from earlier research, which also demonstrated immediate improvements in pain after SCS intervention²²

CONCLUSION

The present study concluded that Strain-Counterstrain is more effective than myofascial release in reducing pain among tertiary care nurses with plantar fasciitis.

Declaration by Authors

Ethical Approval: Approved

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