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ORIGINAL ARTICLE **OPEN ACCESS**

Efficacy of Dry Needling in Patients with Calf Pain in Security Guards of Budhera, Haryana

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ABSTRACT
Calf pain is common among the long-standing work population that has direct influence on the working ability. Management of this disorder includes numerous interventions which depend on severity of pain. Therefore, present study was done to evaluate the effect of dry needling in patients with calf pain on pain pressure threshold, flexibility, and working ability in security guards. Forty adults (age group of 30-40 years) were assigned into two groups; conventional treatment (n=20) and Dry needling along with conventional treatment (n=20). Both groups received 6 weeks of treatment. All participants were assessed pre-intervention (Baseline), 3rd weekand post intervention. NPRS, Goniometer, PressureAlgometer and Working Ability Index were used to evaluate the effect of dry needling on pain, flexibility, threshold and work ability. Each group compares within the group by using repeated-measures ANOVA. All the outcome variable which was found statistically significant by using repeated measures ANOVA test (p<0.05) were further analyzed by using post hoc analysis (Bonferroni test) to check the significance of two group subjects were taken. Mann-Whitney U test for non-normal and independent t-test for normal distribution of data was applied to check the level of significance between the groups. In the present study it has been found that Dry Needling along with Eccentric Training (DN+ET) is better than Eccentric Training (ET). Thus, Dry Needling along with Eccentric Training (DN+ET) can be used clinically to improve calf pain among security guards or long-standing workers.
***Key Words**: Dry Needling, Eccentric Training, Pressure Algometer, Work Ability Index and Calf Pain.*

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INTRODUCTION

WRMSDs (work-related musculoskeletal disorders) are one of the primary causes of occupational disability around the world [20, 2, 11].Work-related musculoskeletal disorders are recorded with high prevalence among employees who are exposed to repetitive and static work along with, prolonged standing [2]. In developing countries, 50-70% of the workforce is at risk of developing musculoskeletal disorders due to the miscellaneous ergonomic risk factors present in their workplace [3, 19].The security guards are the category of workers who are exposed to physically challenging stressful conditions with a heavy workload [9]. In the security profession, security guards spend around 10-12 hours of their duty with prolonged standing. Which leads to diminished performance of calf muscles [10]. The common conditions occurring in the security guards are depression, stress, and musculoskeletal disorders. The common regions for musculoskeletal disorders in standing positions are lower limbs and back that may lead to discomfort and muscle fatigue causing decrease work performance and efficiency [12].

To maintain an upright posture, there is increased perceived exertion, discomfort, and muscle fatigue in the low back [9]. There is a static contraction of the muscle to maintain posture in prolonged standing [11]. Musculoskeletal disorders (MSDs) are described as a wide variety of inflammatory and degenerative conditions that affects muscles, tendons, joints, peripheral nerves, etc [17, 18].The features of MSDs are long-term pain, tiredness, and physical disability. It produces harmful effects on numerous joints that cause increased job restriction, increased absenteeism (lost work), and transfer to another job [16, 17]. According to Janda's approach, the functional imbalance was caused by muscle tightness. The action of antagonists is inhibited by muscle tightness which causes poor posture, overuse of shortened muscles, and weakness. The formation of myofascial trigger points is due to the over activity of shortened muscles [13]. Trigger points have a significant impact on quality of life, causing pain and functional disability, harmful effects on people's social and work-related activities. The soft tissue muscular pain is caused by the presence of myofascial trigger points (MTrPs) (Genma V. & Lopez E. et al,.2017). A myofascial trigger point is defined as a "hypersensitive" area in skeletal muscle that is associated with a palpable swelling in a taut

band and has characteristic referred pain, tenderness at an area, motor dysfunction, and autonomic phenomena [14]. Previous studies showed that 30-85% of musculoskeletal pain is occurred due to trigger points [5-6]. There are numerous non-invasive methods like stretching, ischemic compression, laser therapy, acupressure, ultrasound, and pharmacological treatments for the reduction of musculoskeletal pain. But no treatment was found to be solely effective in the management of pain [7]. Another method to treat muscular pain can be the minimally invasive acupuncture technique 'Dry needling' which can be defined as "skilled intervention using a thin needle to penetrate the skin that cause stimulation of irritable spot, muscle and connective tissue for the management of musculoskeletal pain". It provides a mechanical localized stretch to the shortened sarcomeres and contracted cytoskeletal structures within the trigger points that allow the sarcomere to resume its resting length by reducing the degree of overlap between actin-myosin filaments [20]. Thus, our study focuses on providing the treatment of Musculoskeletal Disorders MSDs and Myofascial Trigger Points MTrPs in security guards who have prolonged standing, as the major activity. It will improve the lifestyle of security guards physically and mentally and also improve their work efficiency and productivity.

MATERIAL AND METHODS

The present study was a comparative study. The study was conducted in the Physiotherapy OPD of SGT Medical College Hospital and Research Institute Budhera (Delhi/ NCR).

Ethical consideration and consent – the proposal of the study was submitted for ethical approval to the ethical committee and was cleared by the institutional Ethical Committee (IEC) of SGT University under the following SGTU/FOP/2020/36 on 06/02/2020. Before the commencement of the study, each subject included in the study was given information about the study and were requested to sign the consent form. A convenient sampling method was used to divide the subjects into two groups ie.Group A- conventional treatment and Group B- Dry needling along with conventional treatment. Inclusion Criteria-Age 30 -40-year-old (both male and female), Subject those who have leg pain, Working continues (8-12) hours, Pain history in the last 6 months, Presence of a palpable taut band in a skeletal muscle, Presence of a hypersensitive spot within the taut band, Palpable or visible local twitch on snapping palpation. Reproduction of referred pain elicited by palpation of the sensitive spot. Pressure pain threshold: 3.2kg/cm2 across in calf muscle were included in the study.

Exclusion Criteria Subjects with needle phobia, diagnosed with peripheral vascular diseases, having an acute infection, Ulcers and fever and allergic to metals were excluded from the study**,** red flag condition**,** Athletes**,** Patients participating in recreational sports**,** Patients diagnosed with Achilles Para tendinopathy Patients who had received previous surgery to either Achilles' tendon. Metabolic diseases (Diabetes, Hyperlipidaemia, Hypercholesterolemia, Hypothyroidism, Metabolic syndrome) inflammatory arthritis and osteoarthritis to the lower limb were excluded**.** Diagnostic Criteria for leg pain. The study used the individual's training method for both the Group, and were provided treatment two time in a day week for six weeks.

GROUP-A (Eccentric training)

Phase1 Warm-up for five minutes (walk-on plane surface)
Phase2 Eccentric training -Procedure (Figure 1)- beginning position of eccentric training is standing on the metatarsal heads of each forefoot on a stepper, the patient lifts the unaffected limb off the bottom and abducts. The affected limb is going to be bearing his / her body weight. The affected limb is then down by dorsiflexing the mortise joint till the plantar side of the heel lies below the level of the stepper, and therefore joint is in the maximum fold. The non-affected limb is adducted to the side of the affected limb, with its foot in most flexure. the weight of the body is transferred to the non-affected foot. The affected limb is abducted away and upraised off the step. The foot of the non-affected limb goes on metatarsal heads, and therefore the cycle is continual. The exercises were performed with the knee extension to eccentrically load the gastrocnemius muscle and flexed to eccentrically load the soleus muscle. Patients aimed to finish 3 sets 15 repetitions with 1 min rest between the sets twice each day 7 days per week for 6 weeks. Patients started with 1 set of 10 repetitions within the 1st day of exercises and step by step progressed to 3sets 15 repetitions 7 days, reaching to complete 3 sets 15 repetitions twice each day by the second week of treatment. Patients were suggested to continue the exercises until he/she feels no pain the training stopped immediately if the patient complains of pain. Patients began to load the calf muscles with their weight and once the exercise was completed with no pain or distress, they progressed to use 5 kg weight. They were invited to still add weight in multiples of 5 kg if they failed to expertise pain within the tendon of Achilles by the end of the third set of the eccentric exercises(Table 1) and the outcome measures were recorded (Figure 2)


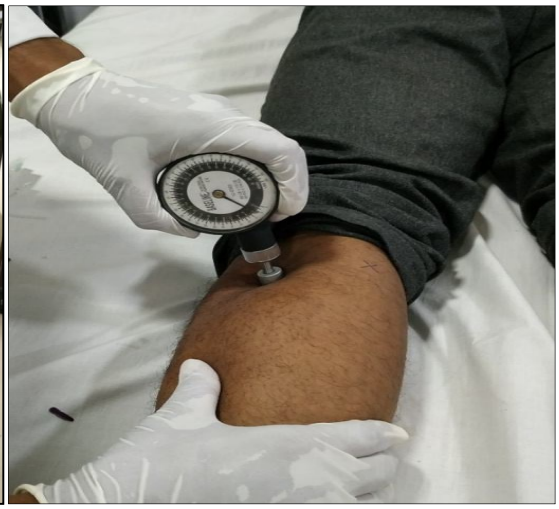

Fig 1: - Eccentric Training Fig:2 - Measurement of Pain Pressure Threshold with Pressure Algometer

Phase 3: Application of Cryotherapy -Ice packs wrapped in a dry towel was placed at the posterior surface of the calf for 15 minutes**.**

Table 1: Treatment protocol. **(Murali K et al,.2006)**

Single heel drops without weight	week 1	Slow pace
	weeks 2 and 3	Quick pace
Single heel drops with weights	weeks 4—5	Slow pace
	week 5 to week 6	Quick pace

GROUP-B (Dry needling with Eccentric training)

Phase1 Warm-up for five minutes (walk-on plane surface)

Phase2 Eccentric training with dry needling

Procedure forDry needling Application of Dry Needling (Figure 3) The muscles dry needled were the soleus and the gastrocnemius muscle. this method was applied with the patients who were positioned in prone lying for gastrocnemius muscle and soleus muscle muscles. The needle length was used 40mm and 50 millimeters.40mm and 50mm for soleus muscle and gastrocnemius muscle muscles. The diameter of the needle used was 0.25 mm., dry needling was given 1 week for an amount of 6 weeks, dry needling of an MTrP aimed to elicit an acceptable response i.e., local twitch response (LTR) - brisk contraction of muscle fibers in its taut band. Following insertion, the acupuncture needle was withdrawn partly associated advanced repeatedly to provide an acceptable response. Once an acceptable response was induced and tolerated by the participant, the needle was left in place for 5 minutes.

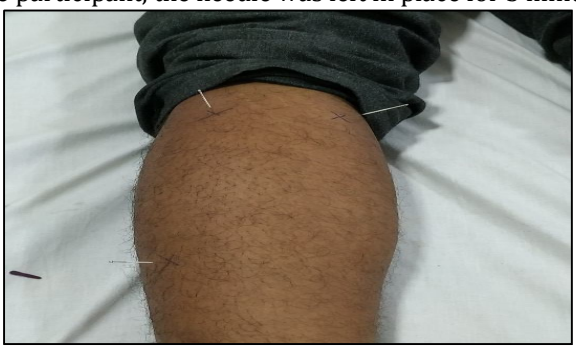

Fig: 3– Dry Needling of Soleus and Gastrocnemius Muscle

Phase 3 Application of Cryotherapy: Ice packs wrapped in a dry towel was placed at the posterior surface of the calf for 15 minutes**.**

RESULT

Comparison between each of the training groups and the outcome variable i.e., Experimental and control group was calculated. Each group compares within the group by using repeated-measures ANOVA. The level of significance was considered at $p< 0.05$. All the outcome variable which was found statistically significant by using repeated measures ANOVA test ($p<0.05$) were further analyzed by using post hoc

analysis (Bonferroni test) to check the significance of two group subjects were taken. Mann-Whitney U test for non-normal and independent t-test for normal distribution of data was applied to check the level of significance between the groups. The data were analyzed by using SPSS (Statistical Package for Social Sciences) SOFTWARE VERSION 25.

Table 2 Descriptive Analysis- Comparison of Conventional within groups using repeated-measures ANOVA

Group A	Pre (Mean ± SD)	Mid (Mean ± SD)	Post (Mean ± SD)	F-value	p-value
NPRS	6.60± 0.88	6.10 ± 1.02	5.40 ± 0.99	25.57	0.008*
AROM RT	10.65 ± 2.06	11.30 ± 1.72	12.400 ± 1.90	11.14	0.012*
AROM LT	10.30 ± 1.08	10.95 ± 1.47	11.90 ± 1.59	11.51	0.010*
PPt MGRT	3.47 ± 0.25	3.73 ± 0.36	4.27 ± 0.52	41.44	0.004*
PPt MGLT	3.51 ± 0.28	3.71 ± 0.44	4.02 ± 0.48	16.16	0.015*
PPt LGRT	3.55 ± 0.23	3.70 ± 0.24	4.17 ± 0.38	35.43	0.006*
PPt LGLT	3.69 ± 0.26	3.88 ± 0.25	4.29 ± 0.31	73.53	0.003*
PPt SRT	4.1 ± 0.57	4.20 ± 0.70	4.73 ± 0.42	16.93	0.014*
PPt SLT	4.15 ± 0.60	4.37 ± 0.51	4.81± 0.33	39.79	0.009*
WAI	17.05 ± 4.11	30.00 ± 1.86	40.35 ± 3.00	295.46	0.001**

Table-2 Describes, the Mean score of NPRS at pre, mid, and post of group-A was 6.60, 6.10, 5.40 respectively. In RT & LT of ankle dorsiflexion ROM Mean value at pre, mid, & post was 10.65, 11.30, 12.40 & 10.30, 10.95,11.90 respectively. The mean score of pain pressure threshold for MG, LG, and S for the right side was 3.47,3.73,4.27, 3.55, 3.70, 4.17, 4.1, 4.2, 4.7 respectively at pre, mid, and post-reading. Similarly, the mean score of pain pressure threshold for MG, LG, and S for LT side was 3.51, 3.71, 4.02, 3.69, 3.88, 4.29, 4.15, 4.37, 4.81 respectively at pre, mid, and post-treatment. At last, the WAI mean score at pre, mid, and post was 17.05, 30.00 & 40.35 respectively. The repeated-measures ANOVA was applied and the test was significant for all the parameters except WAI which was highly significant of the eccentric group at 0.05 level of significance.

Table 3 Post hoc analysis by using Bonferroni test

NPRS	Mean Difference	Std. Error	p-value
Baseline vs 3rd Week	0.500	0.154	0.004*
3rd week vs 6th Week	0.700	0.164	0.001**
6th week vs Baseline	-1.20	0.186	0.001**
AROMRT			
Baseline vs 3rd Week	-0.65	0.335	0.067^{NS}
3rd week vs 6th Week	-1.10	0.315	0.002*
6th week vs Baseline	1.75	0.458	0.001**
AROM LT			
Baseline vs 3rd Week	-0.65	0.274	0.028*
3rd week vs 6th Week	-0.95	0.4	0.028*
6th week vs Baseline	1.60	0.32	0.001**
PPT MGRT			
Baseline vs 3rd Week	-0.255	0.074	0.003*
3rd week vs 6th Week	-0.540	0.08	0.001**
6th week vs Baseline	0.795	0.11	0.001*
PPT MGLT			
Baseline vs 3rd Week	-0.200	0.083	0.026*
3rd week vs 6th Week	-.315	0.085	0.002*
6th week vs Baseline	.515	0.104	0.001**
PPT LGRT			
Baseline vs 3rd Week	-.155	0.047	0.004*
3rd week vs 6th Week	-.460	0.08	0.001**
6th week vs Baseline	.615	0.093	0.001**

PPT LGLT			
Baseline vs 3rd Week	-.190	0.05	0.003*
3rd week vs 6th Week	-.410	0.046	0.001**
6th week vs Baseline	.600	0.055	0.001**
PPT SRT			
Baseline vs 3rd Week	-0.1	0.12	0.415NS
3rd week vs 6th Week	-.525	0.117	0.001**
6th week vs Baseline	.625	0.108	0.001*
PPT SLT			
Baseline vs 3rd Week	-.220	0.054	0.004*
3rd week vs 6th Week	-.435	0.067	0.001**
6th week vs Baseline	.655	0.097	0.001**
WAI			
Baseline vs 3rd Week	-12.95	1.012	0.002*
3rd week vs 6th Week	-10.35	0.762	0.001**
6th week vs Baseline	23.30	1.079	0.001**

****= Highly Significant, *=Significant, NS= Not Significant**

Table 3 Describes, the mean differences group-A by using post hoc analysis by Bonferroni test to check the significance of the different groups. Ankle dorsiflexion right (AROMRT) and Pain Pressure Threshold soleus muscle right (PPT SRT) was not significant at baseline to third week otherwise all parameters are significant at baseline to 3rd week and then highly significant at third week to the sixth week means that there was an improvement when conventional was used to the patients.

Table 4.Comparison of Dry needling + Conventional treatment within groups using repeated-measures ANOVA.

Group B	Pre (Mean ± SD)	Mid (Mean ± SD)	Post (Mean ± SD)	F-value	p-value
NPRS	6.55 ± 0.94	5.10 ± 0.64	2.50 ± 1.05	175.52	0.001**
AROM RT	10.85 ± 1.50	13.35 ± 1.53	19.95 ± 1.05	260.31	0.001**
AROM LT	10.65 ± 1.35	15.05 ± 0.89	20.05 ± 1.19	421.69	0.001**
PPt MGRT	3.54 ± 0.24	4.35 ± 0.41	4.99 ± 0.30	129.41	0.009*
PPt MGLT	3.53 ± 0.28	4.11 ± 0.26	4.90 ± 0.19	208.47	0.001**
PPt LGRT	3.46 ±0.24	4.49 ±0.41	4.83 ± 0.22	128.75	0.001**
PPt LGLT	3.59 ± 0.28	4.01 ± 0.27	4.65 ± 0.17	183.97	0.010*
PPt SRT	3.89 ± 0.24	4.35 ± 0.35	4.94 ± 0.26	155.21	0.004*
PPt SLT	3.93 ± 0.59	4.49± 0.42	5.08 ± 0.16	43.05	0.001**
WAI	18.00 ± 4.29	31.30 ± 2.05	41.45 ± 2.24	330.64	0.001**

***=Significant, **=Highly Significant.**

Table.4 Describes, the Mean score of groups -B NPRS at pre, mid and post was 6.55, 5.10,2.40 respectively. In Right, LT of ankle dorsiflexion Mean value at pre, mid, & post was 10.85, 13.35, 19.95 & 10.65, 15.05,20.05 respectively. The mean score of pain pressure threshold for medial gastrocnemius (MG), lateral gastrocnemius (LG), and Soleus muscle (S) for the right side was (3.54,4.35,4.99), (3.46, 4.49, 4.83), (3.89, 4.35, 4.94) respectively at pre, mid and post changes. Similarly, the mean score of pain pressure threshold for medial gastrocnemius (MG), lateral gastrocnemius (LG), and Soleus muscle (S) for the LT side were (3.53, 4.11, 4.90), (3.59, 4.01, 4.65), (3.93, 4.49, 5.08) respectively at pre, mid and post-treatment. At last, the WAI mean score at pre, mid and post was 18.00, 31.30 & 41.45 respectively. The repeated-measures ANOVA was applied and the test was highly significant for all the eccentric training+ dry needling group except pain pressure threshold of MGRT, LGLT & SRT at 0.05 level of significance.

Table.5Post hoc analysis by using Bonferroni test

NPRS	Mean Difference	Std. Error	p-value
Baseline vs 3rd Week	1.450	0.17	0.002*
3rd week vs 6th Week	2.600	0.234	0.001**
6th week vs Baseline	-4.050	0.246	0.001**
AROM			
Baseline vs 3rd Week	-2.500	.336	0.003*
3rd week vs 6th Week	-6.650	.342	0.001**
6th week vs Baseline	9.150	.335	0.001**

AROM LT			
Baseline vs 3rd Week	-4.400	0.222	0.004*
3rd week vs 6th Week	-4.950	0.198	0.001**
6th week vs Baseline	9.350	0.302	0.001**
PPT MGRT			
Baseline vs 3rd Week	-.810	0.11	0.010*
3rd week vs 6th Week	-.6403	0.082	0.001**
6th week vs Baseline	1.45	0.078	0.001**
PPT MGLT			
Baseline vs 3rd Week	-1.030	0.104	0.022*
3rd week vs 6th Week	-.340	0.104	0.012*
6th week vs Baseline	1.370	0.047	0.001**
PPT LGRT			
Baseline vs 3rd Week	-.550	0.063	0.005*
3rd week vs 6th Week	-.600	0.063	0.002**
6th week vs Baseline	1.150	0.069	0.001**
PPT LGLT			
Baseline vs 3rd Week	-.420	0.077	0.004*
3rd week vs 6th Week	-.640	0.047	0.002*
6th week vs Baseline	1.06	0.074	0.001**
PPT SRT			
Baseline vs 3rd Week	-0.46	0.063	0.003*
3rd week vs 6th Week	-0.59	0.063	0.002*
6th week vs Baseline	1.05	0.069	0.001**
PPT SLT			
Baseline vs 3rd Week	-0.56	0.083	0.002*
3rd week vs 6th Week	-0.55	0.122	0.001**
6th week vs Baseline	1.11	0.145	0.001**
WAI			
Baseline vs 3rd Week	-13.300	0.949	0.020*
3rd week vs 6th Week	-10.150	0.685	0.001**
6th week vs Baseline	23.450	1.067	0.001**

****= Highly Significant, *=Significant, NS= Not Significant**

Table.5 Describes, the mean differences by using post hoc analysis to check the significance of the different groups. All parameters are significant at baseline to 3rd week and then highly significant at third week to the sixth week means that there was an improvement when conventional+ dry needling was used to the patients. In this case, all the parameters are more significant than eccentric techniques

Table 6. Comparison of Pain (NPRS) between the groups using Mann Whitney- U test.

	Groups	Mean Rank	Sum of Ranks	Z-value	p-value
Pre NPRS	Group A	20.73	414.5	0.129	0.898NS
	Group B	20.27	405.5		
Mid NPRS	Group A	26.25	525.0	3.30	0.001**
	Group B	14.75	295.0		
Post NPRS	Group A	30.28	605.5	5.37	0.001**
	Group B	10.73	214.5		
Pre WAI	Group A	19.08	381.5	1.969	0.049NS
	Group B	21.93	438.5		
Mid WAI	Group A	16.9	338	4.178	0.001**
	Group B	24.1	482		
Post WAI	Group A	18.45	369	1.119	0.263NS
	Group B	22.55	451		

****= Highly Significant, *=Significant, NS= Not Significant**

Table.6 Describes, the mean rank of group A & group B for pre-NPRS was 20.73 & 20.27 respectively. At mid and post changes in NPRS, the Mean rank was (26.25, 14.75), (30.28), (10.73) respectively of group A & group B. Similarly for the Working ability index (WAI), the Mean rank was (19.08,21.93) (16.9,24.1) & (18.45, 22.55) respectively of group A and Group B. Non-parametric test (Mann Whitney U test) was applied for comparison between the groups (conventional & Dry needling+ conventional) for a different type of data at pre, mid & post and the p-value for pre-NPRS, pre-WAI and post WAI was not significant at 5% level of significance. All others are significant with each other.

Table 7 Comparison of Range of Motion (Active Range of Motion) between the groups using independent t-test.

	group	Mean ± SD	t-test	p-value
Pre ARomRt	Group A	10.65 ± 2.06	0.351	0.727^{NS}
	Group B	10.85 ± 1.50		
MidAromRt	Group A	11.30 ± 1.72	3.98	0.005*
	Group B	13.35 ± 1.53		
PostAromRt	Group A	19.25 ± 1.21	1.955	0.058
	Group B	20 ± 0.001		
PreAromLt	Group A	10.3 ± 1.08	0.906	0.371^{NS}
	Group B	10.65 ± 1.35		
MidAromLt	Group A	10.95 ± 1.47	10.69	0.001**
	Group B	15.05± 0.89		
PostAromLt	Group A	19.50± 0.95	1.19	0.114
	Group B	20.05 ± 1.19		

****= Highly Significant, *=Significant, NS= Not Significant**

Table.7 Describes, the revealed that the mean value of group A & group B for pre AROM RT was 10.65 & 10.85 respectively. At mid and post changes in ankle dorsiflexion right the Mean valueType equation here. was (11.30, 13.35), (12.40), (20.00) respectively of group A & group B. Similarly for ankle dorsiflexion LT (AROM LT), the Mean value was (10.30,10.65) (10.95,15.05) & (11.90, 20.00) respectively of group A and Group B. Parametric test (Independent t-test) was applied for comparison between the groups (conventional & Dry needling+ conventional) for a different type of data at pre, mid & post and the p-value for pre AROM RT & LT was not significant at 5% level of significance. All others are significant with each other at mid and post readings.

Table 8Comparison of Pain Pressure Threshold (PPt) of Lateral Gastrocnemius between the groups using independent t-test.

		Mean ± SD	t-test	p-value
PrePPtLGRt	Group A	3.55 ± 0.22	1.217	0.231^{NS}
	Group B	3.46 ± 0.24		
MidPPtLGRt	Group A	3.70 ± 0.24	7.66	0.001**
	Group B	4.44 ± 0.35		
PostPPtLGRt	Group A	4.17 ± 0.38	8.51	0.001**
	Group B	5.04 ± 0.26		
PrePPtLGLt	Group A	3.69 ± 0.26	1.166	0.251^{NS}
	Group B	3.59 ± 0.28		
MidPPtLGLt	Group A	3.88 ± 0.25	2.86	0.007*
	Group B	4.11 ± 0.26		
PostPPtLGLt	Group A	4.29 ± 0.31	7.49	0.001**
	Group B	4.90 ± 0.19		

****= Highly Significant, *=Significant, NS= Not Significant**

Table 8 Describes, the mean value of group A & group B for pre-PPTLG RT was 3.55 & 3.46 respectively. At mid and post changes in pain pressure threshold LG right (PPT LGRT), the Mean value was (3.70, 4.44), (4.17), (5.04) respectively of group A & group B. Similarly for pain pressure threshold LG LT (PPT LGLT), the Mean value was (3.69,3.59) (3.88,4.11) & (4.29, 4.90) respectively of group A and Group B. Parametric test (Independent t-test) was applied for comparison between the groups (conventional & Dry needling+

conventional) for a different type of data at pre, mid & post and the p-value for pre-PPTLG RT & LT was not significant at 5% level of significance. All others are significant with each other at mid and post readings.

Table 9 Comparison of Pain Pressure Threshold (PPt) of Soleus between the groups using independent t-test.

		Mean ± SD	t-test	p-value
PrePPtSRt	Group A	4.1 ± 0.57	1.517	0.137^{NS}
	Group B	3.89 ± 0.24		
MidPPtSRt	Group A	4.20 ± 0.70	0.179	0.859^{NS}
	Group B	4.17 ± 0.27		
PostPPTSRt	Group A	4.72 ± 0.42	2.12	0.041*
	Group B	4.94 ± 0.17		
PrePPtSLt	Group A	4.15 ± 0.60	1.166	0.251^{NS}
	Group B	3.93 ± 0.59		
MidPPTSLt	Group A	4.37 ± 0.51	0.811	0.422^{NS}
	Group B	4.49 ± 0.42		
PostPPtSLt	Group A	4.81 ± 0.33	3.11	0.022*
	Group B	5.08 ± 0.16		

****= Highly Significant, *=Significant, NS= Not Significant**

Table.9 Describes, the mean value of group A & group B for pre PPT SRT was 4.1 & 3.89 respectively. At mid and post changes in pain pressure threshold Soleus muscle right (PPT SRT), the Mean value was (4.20, 4.17), (4.72,4.94) respectively of group A & group B. Similarly for pain pressure threshold Soleus muscle LT (PPT SLT), the Mean value was (4.15,3.93) (4.37,4.49) & (4.81, 5.08) respectively of group A and Group B. Parametric test (Independent t-test) was applied for comparison between the groups (conventional & Dry needling+ conventional) for a different type of data at pre, mid & post and the p-value for pre & mid of PPTSRT & LT was not significant at 5% level of significance. All others are significant with each other at mid and post readings.

Table 10 Comparison of Pain Pressure Threshold (PPt) of Medial Gastrocnemius between the groups using independent t-test.

	group	Mean ± SD	t-test	p-value
PrePPtMGRt	Group A	3.47 ± 0.25	0.906	0.371^{NS}
	Group B	3.54 ± 0.24		
MidPPtMGRt	Group A	3.73 ± 0.36	6.03	0.001**
	Group B	4.46 ± 0.41		
PostPPtMGRt	Group A	4.27 ± 0.52	5.43	0.001**
	Group B	4.99 ± 0.30		
PrePPtMGLt	Group A	3.51 ± 0.28	0.224	0.824^{NS}
	Group B	3.53 ± 0.28		
MidPPTMGLt	Group A	3.71± 0.44	5.75	0.002*
	Group B	4.11 ± 0.26		
PostPPtMGLt	Group A	4.03 ± 0.48	6.87	0.001**
	Group B	4.83 ± 0.22		

Table.10 Describes, the mean value of group A & group B for pre-PPT MGRT was 3.47 & 3.54 respectively. At mid and post changes in pain pressure threshold MG right (PPT MG RT), the Mean value was (3.73, 4.46), (4.27,4.99) respectively of group A & group B. Similarly for pain pressure threshold MG LT (PPT MG LT), the Mean value was (3.51,3.53) (3.71,4.11) & (4.03, 4.83) respectively of group A and Group B. Parametric test (Independent t-test) was applied for comparison between the groups (conventional & Dry needling+ conventional) for a different type of data at pre, mid & post and the p-value for pre PPT MG

RT & LT was not significant at 5% level of significance. All others are significant with each other at mid and post readings.

DISCUSSION

The present study was conducted to find out the effect of Conventional treatment and Dry needling along with Conventional treatment on calf pain. A total of 40 subjects were selected with age group of 30-40 years, who met the inclusion criteria and completed the treatment protocol for 6 weeks were divided into two groups, Group A (ET) and Group B (DN+ET). Conventional treatment which consisted of eccentric training with cryotherapy were performed by the subjects in Group-A and subject in Group-B performed Dry needling along with Conventional treatment. The treatment was given two time in a day, for 6 weeks. The outcome measures i.e. (NPRS) were used to assess the pain of both Group-A and Group-B. The data was collected pre, mid and post-intervention i.e., baseline 3^{dr} week end of 6th weeks. The data was analysed in which the Descriptive analysis describes the pain distribution among both the Group ie. Group A (ET) and Group B (DR+ET). The comparison of mean and standard deviation (SD) of NPRS among Group A and B was done. the Mean score of NPRS at pre, mid, and post of 6.60, 6.10, 5.40. were found in Group A and mean and standard deviation of NPRS at pre, mid and post was 6.55, 5.10, 2.40 were found in Group- B. There was significant difference in NPRS was improved in both the intervention group after six months of treatment. But group B has shown more significant improvement in pain reduction as compared to group A. Hence Dry needling along with conventional treatment has shown significant improvement in components of NPRS score given in the study. The mechanism by which dry needling is effective in pain reduction is not fully understood, but various biochemical, neurological, vascular, and clinical changes occur through dry needling. Our study shows the significant improvement in the pain, flexibility, pain pressure threshold, and working ability of the security guards after the application of dry needling. The result of this was in accordance with the gate control theory was proposed by Melzack & Wall in 1965 [15]. They had the assumption that there is blocking of the transmission of noxious information generated in the skin by the stimulation of large diameter A-β sensory afferent fibers when the stimulation reaches at the posterior horn of the spinal cord via small-diameter non-myelinated sensory afferents of C-polymodal and muscle Group-IV nociceptors [7]. The A-delta sensory afferents are stimulated when the superficial dry needling is carried out on the patient. When there is an application of a vigorous and prolonged stimulus, then there is the recruitment of only C-polymodal fibers. A- delta fibers are connected to the Waldeyer cells. These Waldeyer cells are situated in the most uppermost one of the (Lamina-I) of the posterior horn of the spinal cord (Kumazawa& Perl, 1978).There is a very small stalked cell that is present in between the Lamina I and II [1]. The stimulation of stalked type cells by a needle releases an inhibitory opioid called Peptide enkephalin [6, 16].The needle goes through the skin and subcutaneous tissues when there is a stimulation of A-delta nerve fibers during the application of the deep dry needling process. As a result, there is the occurrence of a pain-gate mechanism. There is not only stimulation of Group-II and Group-III afferent fibers, but there is the occurrence of local twitch response (LTR) [3]. This response and any change in the length of muscle fibers take a large diameter sensory afferent proprioceptive input to the spinal cord which blocks the noxious information. Similarly, our study showed that dry needling along with conventional treatment at end of week 6 post treatment in experimental group also resulted in significant improvement in calf pain ($p \leq .0001$).The comparison of mean and standard deviation (SD) of Range of motion (ROM) among Group A and B was done. In RT & LT of ankle dorsiflexion ROM Mean value at pre, mid, & post was 10.65, 11.30, 12.40 & 10.30, 10.95,11.90 were found in Group A and mean and standard deviation In Right, LT of ankle dorsiflexion Mean value at pre, mid, & post was 10.85, 13.35, 20.00 & 10.65, 15.05,20.00 were found in Group- B. There was significant difference in ROM was improved in both the intervention group after six months of treatment. But group B has shown more significant improvement in pain reduction as compared to group A.

CONFLICT OF INTEREST

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