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Original Research Article

Comparative Study of Efficacy Between Dry Needling, Ultrasound Therapy, and Lignocaine Injection on Neck Disability in Patients with Myofascial Trigger Points of the Upper Trapezius Muscle

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Abstract:

Introduction: Myofascial trigger points in the upper trapezius are a common cause of neck pain and functional limitation, contributing to increased neck disability in affected patients.

Aims: This study aimed to compare the efficacy of dry needling, ultrasound therapy, and lignocaine injection in reducing neck disability in patients with upper trapezius myofascial trigger points. Data were collected through history, clinical examination, and recorded in a pre-designed proforma after obtaining informed consent.

Materials and Methods: Comparative and randomized study conducted at the Department of Physical Medicine & Rehabilitation, Sambhu Nath Pandit Hospital, Kolkata, over 1 year, including 60 adults patients with myofascial trigger points of the upper trapezius muscle associated with myofascial pain syndrome.

Result: All three interventions led to a progressive reduction in NDI scores over time. At the first and second visits, differences between groups were not statistically significant. By the third visit, Group B (ultrasound therapy) demonstrated a significantly greater improvement in NDI compared to Group C (lignocaine injection) (p = 0.009), while dry needling showed comparable but slightly lesser improvement. Demographic factors such as age, sex, occupation, handedness, and BMI did not significantly influence outcomes.

Conclusion: Dry needling, ultrasound therapy, and lignocaine injection are all effective in reducing neck disability in patients with upper trapezius myofascial trigger points, with ultrasound therapy providing slightly superior functional improvement. These findings support the use of ultrasound-guided therapy as part of a multimodal approach to managing myofascial pain syndrome.

Keywords: Myofascial trigger points, Neck Disability Index, Dry needling, Ultrasound therapy, Lignocaine injection, Upper trapezius, Myofascial pain syndrome.

Introduction

Myofascial pain syndrome (MPS) is a prevalent cause of chronic musculoskeletal pain, often leading to functional impairment and reduced quality of life [1]. It is characterized by localized muscle pain and tenderness, frequently affecting asymmetric or focal areas of the body. Central to the pathogenesis of MPS are myofascial trigger points (MTrPs), which are hypersensitive, tender spots located within taut bands of muscle fibers [2,3]. MTrPs can be classified as active or latent, with both types contributing to neck and shoulder pain symptoms [4,5]

Various physiatric interventions target MTrPs to alleviate pain and improve function [6,7]. Common treatment modalities include massage, mechanical vibration, electrostimulation, “spray-and-stretch” techniques, trigger-point injections with corticosteroids or lignocaine, dry needling [6,7], and ultrasound therapy [8].

Neck disability is a frequent consequence of MTrPs, significantly impacting activities of daily living and occupational performance [9]. Failure to recognize MTrPs as a source of musculoskeletal pain may lead to misdiagnosis and inadequate management [10]. Palpation of MTrPs elicits localized pain, pain referral to a reference zone, and a local twitch response, highlighting their functional significance [11,12]. The upper trapezius muscle is particularly susceptible to MTrPs, affecting predominantly the working-age population [13,14]. Trigger points in this muscle are a major contributor to neck pain and associated disability, making it a common focus for clinical research [15].

The present study aims to evaluate and compare the efficacy of dry needling, ultrasound therapy, and lignocaine injection in reducing neck disability in patients with myofascial trigger points of the upper trapezius. Data were collected after obtaining informed consent, through detailed history taking, clinical examination, and documented in a predesigned study proforma.

Materials and Methods

Type of study: Comparative and Randomised study.

Place of study: Department of PM&R Sambu Nath Pandit Hospital, Kolkata.

Study Duration: 1 year (October 2019 – October 2020).

Sample Size: 60 Adults patients with myofascial trigger points of the upper trapezius muscle associated with myofascial pain syndrome.

Inclusion Criteria

- Age ≥18 years.
- Symptoms of shoulder and neck pain for less than 6 weeks.
- Typical history of neck and shoulder pain with a palpable taut band in the upper trapezius; palpation elicits a local twitch response and reproduces patient's symptoms.

Exclusion Criteria

- Tumor of the affected area, Known hypersensitivity to lignocaine.
- Cutaneous insensitivity at the treatment site and uncontrolled diabetes or hypertension.
- Local or generalized infection.
- Rheumatoid arthritis or fibromyalgia.
- Pregnancy or lactation.
- Bleeding disorders or patients on anticoagulants.
- Previous steroid injections within the past 6 months.
- Hypothyroidism or malignancy.
- Presence of mechanical implants in the treatment area and severe psychiatric illness or inability to comply with study procedures.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 27 and GraphPad Prism version 5. Numerical variables were summarized as mean ± SD, and categorical variables as counts and percentages. Two-sample t-tests and one-way ANOVA were used to compare means, while Chi-square or Fisher's exact tests were applied for proportions. A p-value ≤ 0.05 was considered statistically significant.

Results

Table 1: Association between baseline characteristics of patients: Group

Variable	Parameters	Group A (n=20)	Group B (n=20)	Group C (n=20)	Total (n=60)	Chi-square value	p-value
Age (years)	≤30	0 (0.0%)	2 (10.0%)	2 (10.0%)	4 (6.7%)	13.2981	0.102
	31–40	2 (10.0%)	7 (35.0%)	4 (20.0%)	13 (21.7%)		
	41–50	5 (25.0%)	3 (15.0%)	8 (40.0%)	16 (26.7%)		
	51–60	8 (40.0%)	4 (20.0%)	6 (30.0%)	18 (30.0%)		
	>60	5 (25.0%)	4 (20.0%)	0 (0.0%)	9 (15.0%)		
Sex	Female	17 (85.0%)	18 (90.0%)	15 (75.0%)	50 (83.3%)	1.68	0.4317
	Male	3 (15.0%)	2 (10.0%)	5 (25.0%)	10 (16.7%)		
Occupation	Clerical/ desk/ computer job	4 (20.0%)	5 (25.0%)	4 (20.0%)	13 (21.7%)	8.1713	0.7716
	Driver	1 (5.0%)	0 (0.0%)	0 (0.0%)	1 (1.7%)		
	Farmer	2 (10.0%)	2 (10.0%)	2 (10.0%)	6 (10.0%)		
	Heavy workers/ weightlifters	0 (0.0%)	1 (5.0%)	0 (0.0%)	1 (1.7%)		
	Housewife	6 (30.0%)	8 (40.0%)	8 (40.0%)	22 (36.7%)		
	Manual labourers/ household workers	4 (20.0%)	4 (20.0%)	5 (25.0%)	13 (21.7%)		
	Shopkeeper	3 (15.0%)	0 (0.0%)	1 (5.0%)	4 (6.7%)		
Handedness	Left	1 (5.0%)	2 (10.0%)	3 (15.0%)	6 (10.0%)	1.1111	0.5738
	Right	19 (95.0%)	18 (90.0%)	17 (85.0%)	54 (90.0%)		
Side of involvement	Left	0 (0.0%)	1 (5.0%)	0 (0.0%)	1 (1.7%)	2.0339	0.3617
	Right	20 (100.0%)	19 (95.0%)	20 (100.0%)	59 (98.3%)		
History of trauma	Absent	17 (85.0%)	18 (90.0%)	15 (75.0%)	50 (83.3%)	1.68	0.4317
	Present	3 (15.0%)	2 (10.0%)	5 (25.0%)	10 (16.7%)		

Past history of similar episodes	Absent	18 (90.0%)	18 (90.0%)	18 (90.0%)	54 (90.0%)	0	1
	Present	2 (10.0%)	2 (10.0%)	2 (10.0%)	6 (10.0%)		
If past history present — side	Left	2 (10.0%)	2 (10.0%)	2 (10.0%)	6 (10.0%)	0	1
	Right	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Comorbidity	COPD/Asthma	1 (5.0%)	0 (0.0%)	0 (0.0%)	1 (1.7%)	10	0.4405
	DM & HTN	0 (0.0%)	1 (5.0%)	0 (0.0%)	1 (1.7%)		
	Hypertension	4 (20.0%)	1 (5.0%)	5 (25.0%)	10 (16.7%)		
	HTN & Hypothyroidism	0 (0.0%)	1 (5.0%)	0 (0.0%)	1 (1.7%)		
	Hypothyroidism	1 (5.0%)	0 (0.0%)	1 (5.0%)	2 (3.3%)		
	No comorbidity	14 (70.0%)	17 (85.0%)	14 (70.0%)	45 (75.0%)		

Table 2: Distribution of mean Neck disability index at all visit: Group

		Number	Mean	SD	Minimum	Maximum	Median	p-value
Neck disability index at 1st visit	Group-A	20	33.3000	7.7194	13.0000	45.0000	35.0000	0.3721
	Group-B	20	32.6500	6.9983	18.0000	45.0000	34.5000	
	Group-C	20	35.4500	4.4186	27.0000	43.0000	36.0000	
Neck disability index at 2nd visit	Group-A	19	18.7895	4.3663	12.0000	27.0000	19.0000	0.4372
	Group-B	20	17.9000	3.9987	12.0000	25.0000	18.0000	
	Group-C	19	19.5263	3.3395	16.0000	27.0000	19.0000	
Neck disability index at 3rd visit	Group-A	17	12.5294	3.5199	7.0000	18.0000	12.0000	0.0131
	Group-B	20	10.9500	3.8041	6.0000	23.0000	10.0000	
	Group-C	17	14.6471	3.5872	8.0000	22.0000	14.0000	

Table 3: Difference of mean Neck disability index at all visit: Group

ANOVA							
		Sum of Squares	**df**	**Mean Square**	**F**	**p-value**	**Remarks**
Neck disability index at 1st visit	Between Groups	85.900	2	42.950	1.006	.372	Not significant
	Within Groups	2433.700	57	42.696			
	Total	2519.600	59				
Neck disability index at 2nd visit	Between Groups	25.891	2	12.946	.840	.437	Not significant
	Within Groups	847.695	55	15.413			
	Total	873.586	57				
Neck disability index at 3rd visit	Between Groups	125.766	2	62.883	4.723	.013	significant
	Within Groups	679.068	51	13.315			
	Total	804.833	53				

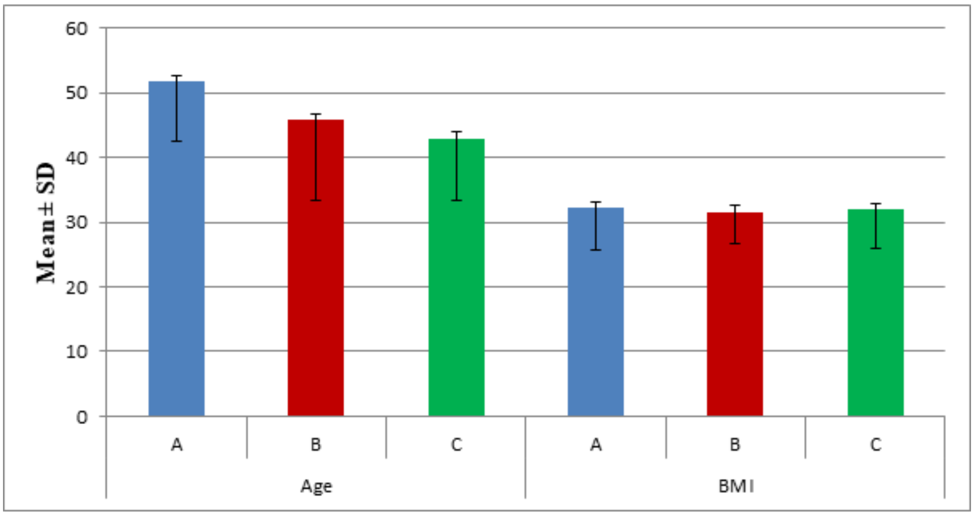

Figure 1: Difference of mean Age and BMI: Group

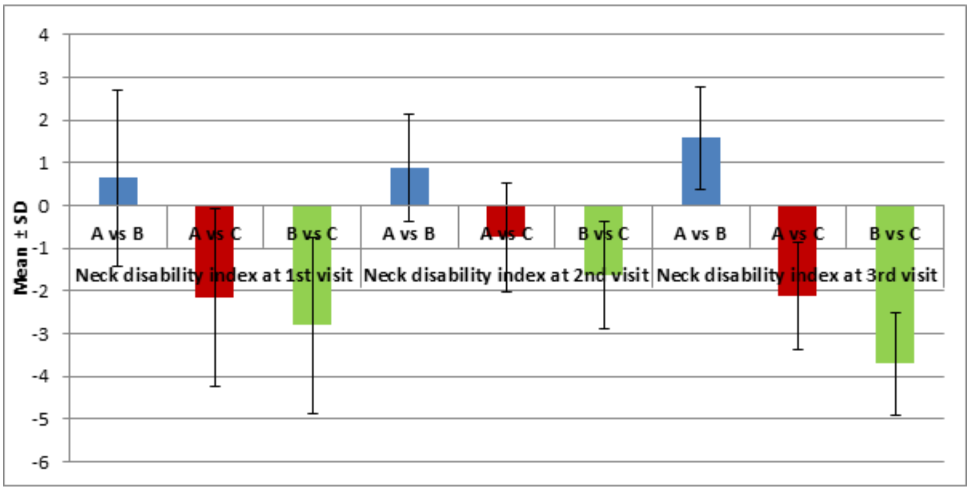

Figure 2: Difference of mean Neck disability index at all visit: Group

Among the 60 participants, age distribution varied across groups, with the highest proportion in the 51–60 years category for Group A (40.0%), 31–40 years for Group B (35.0%), and 41–50 years for Group C (40.0%). The difference in age distribution among groups was not statistically significant ($\chi^2 = 13.2981$, p = 0.102). Females were predominant in all groups (Group A = 85.0%, Group B = 90.0%, Group C = 75.0%), with no significant difference in sex distribution ($\chi^2 = 1.68$, p = 0.4317). Occupational distribution showed housewives as the most common category (36.7% overall), followed by clerical/desk/computer jobs and manual labourers/household workers (each 21.7% overall). The difference in occupation between groups was not significant ($\chi^2 = 8.1713$, p = 0.7716). Right-handedness was dominant (90.0% overall), with no significant difference across groups ($\chi^2 = 1.1111$, p = 0.5738). Most patients had right-side involvement (98.3% overall), with no significant difference ($\chi^2 = 2.0339$, p = 0.3617). History of trauma was absent in 83.3% overall, with no significant intergroup difference ($\chi^2 = 1.68$, p = 0.4317).(Table 1)

At the first visit, the mean NDI scores were 33.30 ± 7.72 in Group A, 32.65 ± 6.99 in Group B, and 35.45 ± 4.42 in Group C, with no statistically significant difference between groups (p = 0.3721). By the second visit, mean NDI scores decreased to 18.79 ± 4.37 in Group A, 17.90 ± 3.99 in Group B, and 19.53 ± 3.34 in Group C, which also did not show a statistically significant difference (p = 0.4372). At the third visit, further improvement was observed, with mean NDI scores of 12.53 ± 3.52 in Group A, 10.95 ± 3.80 in Group B, and 14.65 ± 3.59 in Group C. This difference was statistically significant (p = 0.0131), indicating that the interventions had a differential effect on neck disability over time. (Table 2) Difference of mean Neck disability index at 1st visit with Group was not statistically significant (p=.372). Difference of mean Neck disability index at 2nd visit with Group was not statistically significant (p=.437). Difference of mean Neck disability index at 3rd visit with Group was statistically significant (p=.013). (Table 3) The mean age was highest in Group A (51.70 ± 9.25 years), followed by Group B (45.75 ± 12.48 years) and Group C (42.90 ± 9.48 years). The difference in mean age between the groups was statistically significant (p = 0.0321). The mean BMI was similar across all three groups, with Group A at 32.15 ± 6.40 kg/m², Group B at 31.62 ± 4.95 kg/m², and Group C at 31.92 ± 6.04 kg/m². The difference was not statistically significant (p = 0.9594). (Figure1)

Neck disability index at 1st visit

It was found that, mean difference of A vs B group was .650 with 95% Confidence Interval [-4.32– 5.62]. This was statistically not significant [.947]. It was found that, mean difference of A vs C group was -2.150 with 95% Confidence Interval [-7.12– 2.82]. This was statistically not significant [.555]. It was found that, mean difference of B vs C group was -2.800 with 95% Confidence Interval [-7.77– 2.17]. This was statistically not significant [.371]. Neck disability index at 2nd visit: It was found that, mean difference of A vs B group was .889 with 95% Confidence Interval [-2.14– 3.92]. This was statistically not significant [.760]. It was found that, mean difference of A vs C group was -.737 with 95% Confidence Interval [-3.80– 2.33]. This was statistically not significant [.832]. It was found that, mean difference of B vs C group was -1.626 with 95% Confidence Interval [-4.66– 1.40]. This was statistically not significant [.405]. Neck disability index at 3rd visit: It was found that, mean difference of A vs B group was 1.579 with 95% Confidence Interval [-1.33– 4.49]. This was statistically not significant [.395]. It was found that, mean difference of A vs C group was -2.118 with 95% Confidence Interval [-5.14– .90]. This was statistically not significant [.218]. It was found that, mean difference of B vs C group was -3.697* with 95%

Confidence Interval [-6.60– -.79]. This was statistically significant [.009]. (Figure2)

Discussion

Comparative and randomized study conducted at the Department of Physical Medicine & Rehabilitation, Sambhu Nath Pandit Hospital, Kolkata, over 1 year, including 60 adults' patients with myofascial trigger points of the upper trapezius muscle associated with myofascial pain syndrome.

In our study, Among the 60 participants, age distribution varied across groups, with the highest proportion in the 51–60 years category for Group A (40.0%), 31–40 years for Group B (35.0%), and 41–50 years for Group C (40.0%). The difference in age distribution among groups was not statistically significant (χ^2 = 13.2981, p = 0.102). A similar trend was reported by Gerwin RD et al. [1], who found that myofascial pain syndrome affected a wide age range with no significant clustering in specific age groups.

Females were predominant in all groups (Group A = 85.0%, Group B = 90.0%, Group C = 75.0%), with no significant difference in sex distribution (χ^2 = 1.68, p = 0.4317). Money ID et al. [3] also reported a female predominance in patients with myofascial trigger points.

Occupational distribution showed housewives as the most common category (36.7% overall), followed by clerical/desk/computer jobs and manual labourers/household workers (each 21.7% overall), with no significant intergroup differences (χ^2 = 8.1713, p = 0.7716). Han SC & Harrison P [4] similarly observed that sedentary or repetitive postures were common risk factors across diverse occupational groups.

Right-handedness was dominant (90.0% overall), with most patients having right-side involvement (98.3% overall). These findings align with Liu L et al. [5], who noted that myofascial trigger points often occur on the dominant side due to repetitive use.

History of trauma was absent in 83.3% overall, with no significant intergroup differences (χ^2 = 1.68, p = 0.4317). Similar Study by Gerwin RD et al. [1] found that myofascial pain syndrome (MPS) can develop independent of acute trauma.

In our study, At the first visit, the mean NDI scores were 33.30 ± 7.72 in Group A, 32.65 ± 6.99 in Group B, and 35.45 ± 4.42 in Group C, with no statistically significant difference between groups (p = 0.3721). By the second visit, mean NDI scores decreased to 18.79 ± 4.37 in Group A, 17.90 ± 3.99 in Group B, and 19.53 ± 3.34 in Group C, which also did not show a statistically significant difference (p = 0.4372). At the third visit, further improvement was observed, with mean NDI scores of 12.53 ± 3.52 in Group A, 10.95 ± 3.80 in Group B, and 14.65 ± 3.59 in Group C. This difference was statistically significant (p = 0.0131), indicating that the interventions had a differential effect on neck disability over time. Difference of mean Neck disability index at 1st visit with Group was not statistically significant (p=.372). Difference of mean Neck disability index at 2nd visit with Group was not statistically significant (p=.437). Difference of mean Neck disability index at 3rd visit with Group was statistically significant (p=.013). In our study, The mean age was highest in Group A (51.70 ± 9.25 years), followed by Group B (45.75 ± 12.48 years) and Group C (42.90 ± 9.48 years). The difference in mean age between the groups was statistically significant (p = 0.0321). The mean BMI was similar across all three groups, with Group A at 32.15 ± 6.40 kg/m², Group B at 31.62 ± 4.95 kg/m², and Group C at 31.92 ± 6.04 kg/m². The difference was not statistically significant (p = 0.9594). Similar study by, Twaddle R et al [18](2016) found that to compare the effect of dry-needling and multimodal physiotherapy versus physiotherapy alone in individuals who have undergone rotator cuff repair or proximal humeral fracture repair with the proximal humeral internal locking system. Randomised controlled trial of 20 patients (mean age 58 SD 12 years) who were experiencing post-surgical shoulder pain

In our study, Neck disability index at 1st visit: It was found that, mean difference of A vs B group was .650 with 95% Confidence Interval [-4.32– 5.62]. This was statistically not significant [.947]. It was found that, mean difference of A vs C group was -2.150 with 95% Confidence Interval [-7.12– 2.82]. This was statistically not significant [.555]. It was found that, mean difference of B vs C group was -2.800 with 95% Confidence Interval [-7.77– 2.17]. This was statistically not significant [.371]. Neck disability index at 2nd visit: It was found that, mean difference of A vs B group was .889 with 95% Confidence Interval [-2.14– 3.92]. This was statistically not significant [.760]. It was found that, mean difference of A vs C group was -.737 with 95% Confidence Interval [-3.80– 2.33]. This was statistically not significant [.832]. It was found that, mean difference of B vs C group was -1.626 with 95% Confidence Interval [-4.66– 1.40]. This was statistically not significant [.405]. Neck disability index at 3rd visit: It was found that, mean difference of A vs B group was 1.579 with 95% Confidence Interval [-1.33– 4.49]. This was statistically not significant [.395]. It was found that, mean difference of A vs C group was -2.118 with 95% Confidence Interval [-5.14– .90]. This was statistically not significant [.218]. It was found that, mean difference of B vs C group was -3.697* with 95% Confidence Interval [-6.60– -.79]. This was statistically significant [.009]. Similar findings were reported by Kang JJ et al. (2019), who found that ultrasound-guided myofascial trigger point injections significantly improved NDI, SPADI, VAS, ROM, and MMT scores compared to blind injections [16], and by Kim SA et al. (2013), who demonstrated improvements in NDI, pain, and ROM following trigger point injections with or without ischemic compression in the upper trapezius [17].

Conclusion

In conclusion, all three interventions—dry needling, ultrasound therapy, and lignocaine injection—effectively reduced neck disability in patients with myofascial trigger points of the upper trapezius over time.

While initial and second-visit NDI scores showed no significant differences between groups, by the third visit, ultrasound therapy demonstrated a significantly greater improvement compared to lignocaine injection, suggesting superior functional outcomes. Demographic factors such as age, sex, occupation, handedness, and history of trauma did not substantially influence these results, and BMI was similar across groups. These findings indicate that ultrasound therapy may offer a more sustained benefit in reducing neck disability, although all three interventions contribute to meaningful functional improvement.

Reference

1. Gerwin RD. Classification, epidemiology, and natural history of myofascial pain syndrome. Current pain and headache reports. 2001 Oct 1;5(5):412-20.
2. Money S. Pathophysiology of trigger points in myofascial pain syndrome. Journal of pain & palliative care pharmacotherapy. 2017 Apr 3;31(2):158-9.
3. Authors: Money Irich D. Myofascial trigger points: comprehensive diagnosis and treatment: Elsevier Ltd; 2013.S.
4. Han SC, Harrison P. Myofascial pain syndrome and trigger-point management. Reg Anesth. 1997;22:89–101.
5. Liu L, Huang QM, Liu QG, Ye G, Bo CZ, Chen MJ, Li P. Effectiveness of dry needling for myofascial trigger points associated with neck and shoulder pain: a systematic review and meta-analysis. Archives of physical medicine and rehabilitation. 2015 May 1;96(5):944-55.
6. Arias-Buría JL, Valero-Alcaide R, Cleland JA, Salom-Moreno J, Ortega-Santiago R, Atín-Arratibel MA, Fernández-de-las-Peñas C. Inclusion of trigger point dry needling in a multimodal physical therapy program for postoperative shoulder pain: a randomized clinical trial. Journal of manipulative and physiological therapeutics. 2015 Mar 1;38(3):179-87.
7. Hall ML, Mackie AC, Ribeiro DC. Effects of dry needling trigger point therapy in the shoulder region on patients with upper extremity pain and dysfunction: a systematic review with meta-analysis. Physiotherapy. 2018 Jun 1;104(2):167-77.
8. Randomized controlled study of the antinociceptive effect of ultrasound on trigger point sensitivity; Novel applications in myofascial therapy? John Z. Srbely, James P. Dickey First Published May 1, 2007 Research Article.
9. Greenberg DL. Evaluation and treatment of shoulder pain. Med Clin N Am. 2014;98(3):487–504.
10. Davies Clair; Davies Amber (2004). The trigger point therapy workbook: your self-treatment guide for pain relief (2nd ed.). Oakland, California: New Harbinger Publications. p. 323.
11. Travell, Janet; Simons David; Simons Lois (1999). Myofascial Pain and Dysfunction: The Trigger Point Manual (2 vol. set, 2nd Ed.). USA: Lippincott Williams & Williams.
12. David J. Alvarez, D.O., and Pamela G. Rockwell, D.O., University of Michigan Medical School, Ann Arbor, Michigan. Am Fam Physician. 2002 Feb 15;65(4):653-661.
13. Chang CW, Chang KY, Chen YR, Kuo PL. Electrophysiologic evidence of spinal accessory neuropathy in patients with cervical myofascial pain syndrome. Archives of physical medicine and rehabilitation. 2011 Jun 1;92(6):935-40.
14. Cole TM, Edgerton VR. Musculoskeletal disorders. In: Cole TM, Edgerton VR, eds. Report of the Task Force on Medical Rehabilitation Research: June 28–29, 1990, Hunt Valley Inn, Hunt Valley, Md. Bethesda: National Institutes of Health, 1990:61–70.
15. Fernandez-de-las-Penas C, Alonso-Blanco C, Miangolarra JC. Myofascial trigger points in subjects presenting with mechanical neck pain: a blinded, controlled study. Manual therapy. 2007 Feb 1;12(1):29-33.
16. Kang JJ, Kim J, Park S, Paek S, Kim TH, Kim DK. Feasibility of ultrasound-guided trigger point injection in patients with myofascial pain syndrome. InHealthcare 2019 Dec (Vol. 7, No. 4, p. 118). Multidisciplinary Digital Publishing Institute.
17. Kim SA, Oh KY, Choi WH, Kim IK. Ischemic compression after trigger point injection affect the treatment of myofascial trigger points. Annals of rehabilitation medicine. 2013 Aug;37(4):541.
18. Twaddle R. Inclusion of trigger point dry needling in a multimodal physical therapy program for postoperative shoulder pain: a randomised controlled trial. New Zealand Journal of Physiotherapy. 2016 Jul 1;44(2).