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Recovery from temporomandibular joint dysfunction: An overview of different physiotherapy approaches

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Abstract
Background of the study is that Temporomandibular joint dysfunction (TMJD) refers to a group of problems related to the temporomandibular joint. The etiology of TMJD is still unclear and is believed to be complex. Objective of the study is to compare the effectiveness of Myofascial Release Technique, Positional Release Technique & Conventional Therapy on pain, Mouth opening & functional status in temporomandibular joint dysfunction patients. Method includes temporomandibular joint dysfunction patients (N=30) recruited and randomly allocated into three groups (Myofascial Release Technique-MFR, Positional Release Technique and Conventional Therapy. All the groups completed 3 weeks of intervention.
Results of the study includes the 3 weeks of treatment program resulted in significant improvement in reduction of pain (NPRS $p<0.05$) & increase in mouth opening ($p<0.05$) & increase the functional status in TMJD patients. However, was found to be more clinically effective compared to MFR in all outcome scores. Conclusions of the study is that both MFR & PRT are effective in reducing pain and increasing mouth opening in TMJD subjects. However MFR was found to be superior to PRT.

Keywords: temporomandibular joint dysfunction, myofascial release technique, NPRS & ROM, jfls-20

Introduction
TMJD consist of cluster of pathologies affecting the masticatory muscles, the temporomandibular joint and structures related to it [1]. TMJD is usually has one or more distinct signs or symptoms: pain in the joint, joint sounds, limitation in jaw movement, muscle tenderness and joint tenderness. TMJ disorders comprising of myofascial pain and dysfunction may be included in the broad group of non-specific generalized muscular aches and pains affecting other muscle groups in the body. These disorders also are referred to as "temporomandibular dysfunction," "craniomandibular disorders," and "mandibular dysfunction [2]. Modalities & techniques that have been utilized within the scope of physical therapy to treat temporomandibular joint dysfunction included the use of transcutaneous electrical nerve stimulation, interferential current stimulation, iontophoresis, ultrasonic therapy, MET, PFR and heat application [3]. It is most prevalent in females aged between 20 and 45 years old and it is subdivided by the American Academy of Orofacial Pain (AAOP) into muscular TMD and articular TMD; with the muscular type being much more prevalent, although it is possible for both to occur concomitantly [4]. Individuals who report pain and functional limitation, pain in other regions of the body and disease summarization present TMD of greater severity and longer duration [5-7]. Exercise is the first treatment choice for patients with muscular TMD, since it presents low cost and good effectiveness [8]. Myofascial Release Technique (MFR) is the technique of application of low load, long duration stretch to the myofascial complex which restores optimal length and thus decreases the pain & improves function [9-11]. Positional release technique (PRT), also called strain and counter-strain, Positional release technique utilizes passive body positioning of muscle spasms and dysfunctional joints toward positions of comfort that compress or shorten the offending structure. The movement toward shortening is proposed to relax aberrant reflexes that produce the muscle spasm [12]. Exercises used for the treatment of muscular TMD are intended to reduce pain, improve coordination of masticatory muscles, reduce muscle spasm and hyperactivity, restore the original muscle length, strengthen the muscles involved and promote tissue repair and regeneration. There is dearth in literature with respect to positional release technique. Very few studies have been done on the subject. However the concept of positional release technique is well documented in the text references the aim of the current study is to compare the effect of diff tech on pain, functional status & mouth opening in the patients of temporomandibular joint dysfunction.

Materials and Methods
Study Design
Pretest, posttest experimental group design was carried out with sample of 30 patients with temporomandibular JOINT Dysfunction. Subjects were randomly allocated using conventional random sampling to receive MFR, PRT &. Home therapy Program. Informed consent was taken from all the participants included in the study. All the participants who met the inclusion criteria were evaluated thoroughly using screening Performa.

Source of Data
SGT Hospital, Physiotherapy OPD Gurugram, Haryana.
Inclusion and Exclusion criteria
Participants with Temporomandibular joint dysfunction were selected and were included in the study after meeting the following inclusion criteria: Symptomatic subjects between

the age group of 20-40 years (both male and female).Subjects having pain in temporomandibular joint, (reduced mouth opening (3-5 mm) NPRS Score minimum of 6-8. Symptoms of less than 10 DAYS & Score of JFLS-20 160-180.
Subjects with following conditions were excluded from the study with H/o trauma, surgery, acute infectionsany systemic disorders, osteoporosis, Cervical spine or any upper limb dysfunction, neurological impairments, degenerative & inflammatory TMJ Artheritis, any history of dislocation of TMJ, recent steroid infiltration, patient not willing to participate

Interventions

Patients in Group A received: MFR (myofascial release technique) with Patient lying supine and therapist standing besides the patient and applying gross release technique for masseter and pterygoids muscles with dosage of Total 5 times/ session, 5SEC rest, and 3 times/week for 4 weeks [15-16].

Patients in Group B received: PRT (positional release technique)with Patient lying supine and therapist standing besides the patient and applying Positional release technique for masseter and pterygoids muscles in which muscles are placed in the position of great comfort with dosage of Total 5 times/ session, 5 SEC rest, and 3 times/week for 4 weeks.

Patients in Group A received: Conventional Physiotherapy that included Ultrasound Therapy over TM joint with Mode 1:1, frequency of 1MHz, intensity of 1.5 W/cm, duration of 5 minutes and dosage of 3 times/week, Patients were also taught Jaw & Stick Exercises (Figure: 3 & 4) with dosage of 10 times in 1 set total 5 sets, 3 times/week [17, 18].

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Outcome and Measurements

Pain was measured using NPRS Scale and vernier caliper scale & JFLS-20 for pain, mouth opening & mobility of the jaw function. All the outcome measurements were taken at the day 1, day 14 and then 21 day for all the groups.

Results

Table 1: Frequency table for all variables

	NPRS 1	NPRS14	NPRS21	MMO 1	MMO 14	MMO 21	JFLS-201	JFLS-2014	JFLS-2021
N	30	30	30	30	30	30	30	30	30
Mean	7.80	4.80	2.77	4.17	27.17	32.00	172.13	136.33	38.03
Std. Error of Mean	.155	.155	.149	.145	.300	.296	1.409	1.528	.894
Std. Deviation	.847	.847	.817	.791	1.642	1.619	7.718	8.368	4.895

Table 2: Within Group Analysis of Group A on Day 1 (Myofascial Release)

			NPRS 1	MMO 1	JFLS-20-1
Spearman's rho	NPRS 1	Correlation Coefficient	1.000	-.980**	1.000**
		Sig. (2-tailed)	.	.000	.
		N	10	10	10
	MMO 1	Correlation Coefficient	-.980**	1.000	-.980**
		Sig. (2-tailed)	.000	.005	.000
		N	10	10	10
	JFLS-20-1	Correlation Coefficient	1.000**	-.980**	1.000
		Sig. (2-tailed)	.	.005	.
		N	10	10	10

Table 3: Within Group Analysis of Group A on Day 14 (Myofascial Release Techniques)

			NPRS 14	MMO 14	JFLS-20-14
Spearman's rho	NPRS 14	Correlation Coefficient	1.000	-.960**	.956**
		Sig. (2-tailed)	.	.000	.000
		N	10	10	10
	MMO 14	Correlation Coefficient	-.960**	1.000	-.905**
		Sig. (2-tailed)	.000	.	.000
		N	10	10	10
	JFLS-20-14	Correlation Coefficient	.956**	-.905**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	10	10	10

Table 4: Within Group Analysis of Group A on Day 21(Myofascial Release Techniques)

			NPRS 21	MMO 21	JFLS-20-21
Spearman's rho	NPRS 21	Correlation Coefficient	1.000	-.908**	.778**
		Sig. (2-tailed)	.	.000	.008
		N	10	10	10
	MMO 21	Correlation Coefficient	-.908**	1.000	-.809**
		Sig. (2-tailed)	.000	.	.005

		N	10	10	10
	JFLS-20-21	Correlation Coefficient	.778**	-.809**	1.000
		Sig. (2-tailed)	.008	.005	.
		N	10	10	10

Table 5: Within Group Analysis of Group B on Day 1 (positional Release technique)

			NPRS 1	MMO 1	JFLS-20 1
Spearman's rho	NPRS 1	Correlation Coefficient	1.000	-1.000**	1.000*
		Sig.(2-tailed)	.	.	.
		N	10	10	10
	MMO 1	Correlation Coefficient	-1.000**	1.000	-1.000**
		Sig.(2-tailed)	.	.	.
		N	10	10	10
	JFLS-20 1	Correlation Coefficient	1.000**	-1.000**	1.000
		Sig.(2-tailed)	.	.	.
		N	10	10	10

Table 6: Within Group Analysis of Group B on Day 14 (positional Release technique)

			NPRS 14	MMO 14	JFLS-20 14
Spearman's rho	NPRS 14	Correlation Coefficient	1.000	-.990**	.947**
		Sig.(2-tailed)	.	.000	.000
		N	10	10	10
	MMO 14	Correlation Coefficient	-.990**	1.000	-.956**
		Sig.(2-tailed)	.000	.	.000
		N	10	10	10
	JFLS-20 14	Correlation Coefficient	.947**	-.956**	1.000
		Sig.(2-tailed)	.000	.000	.
		N	10	10	10

Table 7: Within Group Analysis of Group B on Day 21 (positional Release technique)

			NPRS 21	MMO 21	JFLS-20 21
Spearman's rho	NPRS 21	Correlation Coefficient	1.000	-.990**	.950**
		Sig.(2-tailed)	.	.000	.000
		N	10	10	10
	MMO 21	Correlation Coefficient	-.990**	1.000	-.931**
		Sig.(2-tailed)	.000	.	.000
		N	10	10	10
	JFLS-20 21	Correlation Coefficient	.950**	-.931**	1.000
		Sig.(2-tailed)	.000	.000	.
		N	10	10	10

Table 8: Within Group Analysis of Group C on Day 1 (Conventional Therapy)

			NPRS 1	MMO 1	JFLS-20 1
Spearman's rho	NPRS 1	Correlation Coefficient	1.000	-1.000**	.570
		Sig.(2-tailed)	.	.	.085
		N	10	10	10
	MMO 1	Correlation Coefficient	-1.000**	1.000	-.570
		Sig.(2-tailed)	.	.	.085
		N	10	10	10
	JFLS-20 1	Correlation Coefficient	.570	-.570	1.000
		Sig.(2-tailed)	.085	.085	.
		N	10	10	10

Table 9: Within Group Analysis of Group C on Day 1 (CONVENTIONAL THERAPY)

			NPRS 14	MMO 14	JFLS-20 14
Spearman's rho	NPRS 14	Correlation Coefficient	1.000	-.694*	.604
		Sig.(2-tailed)	.	.026	.064
		N	10	10	10
	MMO 14	Correlation Coefficient	-.694*	1.000	-.901**
		Sig.(2-tailed)	.026	.	.000

		N	10	10	10
	JFLS-20 14	Correlation Coefficient	.604	-.901**	1.000
		Sig.(2-tailed)	.064	.000	.
		N	10	10	10

Table 10: Within Group Analysis of Group C on Day 21 (Conventional Therapy)

			NPRS 21	MMO 21	JFLS-20 21
Spearman's rho	NPRS 21	Correlation Coefficient	1.000	-.351	.287
		Sig.(2-tailed)	.	.319	.421
		N	10	10	10
	MMO 21	Correlation Coefficient	-.351	1.000	-.950**
		Sig.(2-tailed)	.319	.	.000
		N	10	10	10
	JFLS-20 21	Correlation Coefficient	.287	-.950**	1.000
		Sig.(2-tailed)	.421	.000	.
		N	10	10	10

Table 11: Between Group Analysis of Groups A & B on Day 1

Day 1		N	Mean Rank	Mann Whitney- U	P value
NPRS 1	Group A	10	10.00	45	0.690
	Group B	10	11.00		
MMO1	Group A	10	10.80	47	0.809
	Group B	10	10.20		
JFLS-20 1	Group A	10	10	45	0.690
	Group B	10	11		

Table 12: Between Group Analysis of Groups A & B on Day 14

Day 14		N	Mean Rank	Mann Whitney- U	P value
NPRS 14	Group A	10	10.00	45	0.690
	Group B	10	11.00		
MMO14	Group A	10	10.55	49	0.968
	Group B	10	10.45		
JFLS-20 14	Group A	10	9.70	42	0.545
	Group B	10	11.30		

Table 13: Between Group Analysis of Groups A & B on Day 21

Day21		N	Mean Rank	Mann Whitney- U	P value
NPRS 21	Group A	10	9.70	42	0.521
	Group B	10	11.30		
MMO21	Group A	10	10.55	49	0.968
	Group B	10	10.45		
JFLS-20 2 1	Group A	10	11.20	43	0.595
	Group B	10	9.80		

Table 14: Between Group Analysis of Groups B & C on Day 1

Day1		N	Mean Rank	Mann Whitney- U	P value
NPRS 1	Group B	10	10.80	47	0.809
	Group C	10	10.20		
MMO1	Group B	10	10.20	47	0.809
	Group C	10	10.80		
JFLS-20 1	Group B	10	11.15	43	0.598
	Group C	10	9.85		

Table 15: Between Group Analysis of Groups B & C on Day 14

Day 14		N	Mean Rank	Mann Whitney- U	Pvalue
NPRS 14	Group B	10	10.80	47	0.809
	Group C	10	10.20		
MMO14	Group B	10	10.10	46	0.752
	Group C	10	10.90		
JFLS-20 14	Group B	10	11.25	42	0.568
	Group C	10	9.75		

Table 16: Between Group Analysis of Groups B & C on Day 21

Day 21		N	Mean Rank	Mann Whitney- U	P value
NPRS 21	Group B	10	10.80	47	0.809
	Group C	10	10.20		
MMO21	Group B	10	10.95	45	0.726
	Group C	10	10.05		
JFLS-20 2 1	Group B	10	11.40	41	0.494
	Group C	10	9.60		

Table 17: Between Group Analysis of Groups A & C on Day 1

Day 1		N	Mean Rank	Mann Whitney- U	P value
NPRS 1	Group A	10	10.30	48	0.809
	Group C	10	10.70		
MMO1	Group A	10	10.50	50	0.809
	Group C	10	10.50		
JFLS-20 1	Group A	10	10.65	48	0.598
	Group C	10	10.35		

Table 18: Between Group Analysis of Groups A & C on Day 14

Day 14		N	Mean Rank	Mann Whitney- U	P value
NPRS 14	Group A	10	10.80	47	0.872
	Group C	10	10.20		
MMO14	Group A	10	10.20	47	1.000
	Group C	10	10.80		
JFLS-20 14	Group A	10	11.15	43	0.904
	Group C	10	9.85		

Table 19: Between Group Analysis of Groups A & C on Day 21

Day 21		N	Mean Rank	Mann Whitney- U	P value
NPRS 21	Group A	10	10.00	45	0.684
	Group C	10	11.0		
MMO21	Group A	10	10.95	45	0.725
	Group C	10	10.05		
JFLS-20 21	Group A	10	12.50	30	0.129
	Group C	10	8.50		

Discussion

Present study compared the effectiveness of myofacial release (MFR), positional release technique (PRT) and conventional therapy in patients with temporomandibular dysfunction (TMD). The subjects in this study had similar baseline values of all the dependent variables suggesting that all groups had homogeneous distribution of patients.

In this study mean value of all 30 patients with respect to NPRS was 7.80± 0 .847 on day 1, 4.80±847 on day 14 and 2.77±0.817 on day 21. There was significant improvement in all the groups at the end of the treatment session with respect to reduction of pain. However between group analysis did not show statistically significant improvement. Although U values showed significant improvement, between group A& B (45 to 42), between group B & C (47 to 45), between group A&C (50 to 45).The results are suggestive of almost similar effect of MFR and PRT on reducing pain but in comparison of MFR and Conventional Therapy, MFR stands out remarkably.

Similarly, mean value of vernier caliper scale for mouth opening was 4.17±0.791 on day 1, 27.17±1.642 on day 14 and 32.00±1.619 on day 21. There was significant improvement within the groups at the end of treatment session with respect to increase in mouth opening. However between group analysis did not show statistically significant improvement. Although U values ranged from (47 to 49) between groups A& B, indicating MFR approach slightly better in mouth opening showed as compared to PRT. In between groups B&C, the mouth opening ranged from(47 to 45), suggesting PRT to be better suited than conventional therapy and again remarkable improvement in mouth opening was seen in MFR group i.e. group A as compared to conventional therapy i.e. group C which is from (50 to 45).

Mean value of jaw functional limitation scale was 172.13±7.718 on day 1, 136.33±8.368 on day 14 and 38.03±4.895 on day 21. There was significant improvement within the groups at the end of treatment session with respect to jaw functional limitation scale. However between group analysis did not show statistically significant improvement. Although U values improved from (45 to 43) between groups A&B, (43 to 41) between groups B&C and (48 to 30) between groups A&C. These readings reiterate the finding that both MFR & PRT can improve TMD, only MFR has slightly more better result in comparison with conventional therapy.

Our results indicate quite clearly that both MFR and PRT can bring down patients symptoms in temporomandibular dysfunction. And both treatment approaches are better than

conventional therapy alone in improving patient's dysfunction. However effect of MFR is essentially better vis a vis conventional therapy alone. Myofascial Release Technique (MFR) is the technique of application of low load, long durationstretch to the myofascial complex which restores optimal length and thus decreases the pain & improves function[19].PRT also known by its parent term strain counterstrain, Therapeutic tech that uses a position of comfort of the body, its appendages and its tissues to resolved somatic dysfunction. somatic dysfunction defined as disturbance in the sensory or proprioceptive system that results in spinal segmental tissue facilitation and inhibition (korr 1975). Jones 1973 proposed that as a result of somatic dysfunction tissue often become kinked or knotted resulting in pain, spasm, loss of ROM. Simply, PRT unkinks tissues much as one would a knotted necklace, by gently twisting & pushing the tissues together to take tension off the knot. When one link in the chain is unkinked other nearby untangled, producing profound pain relief (speiche & draper 2006) [20, 21]. We do acknowledge the limitation of the study, being small sample size due to which between group analysis could not show statistically significant result. Further studies are warranted in this area with bigger sample size.

Conclusion

Our study leads to conclusion that both positional release technique and Myofascial Release Technique are effective in the management of Temporomandibular Joint Dysfunction but myofascial release technique was found to be slightly better than positional release technique and remarkably better than the conventional therapy in the management of Temporomandibular Joint Dysfunction.

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