IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

MOVEMENT BASED APPROACH FOR TEMPOROMANDIBULAR JOINT DYSFUNCTION IN POST MANDIBULAR FRACTURE

A CASE SERIES STUDY

Dr. N N BOBBY

HOD, School of Physiotherapy, Dhanalakshmi Srinivasan University, Trichy. TN

Mandibular fractures are the most common among facial skeleton fractures. The causes of mandibular fractures include falls, interpersonal violence, motor vehicle accidents, pathology and iatrogenic during to other removal. Assaults are the most common cause of isolated mandible fracture. The available treatment strategies for mandibular sub condylar fracture are open or closed reduction with maxillomandibular fixation (MMF), conservative treatment that includes observation, analgesics, anti-inflammatory, soft diet and early physical therapy exercise. Closed reduction of mandibular fracture with MMF can adversely affect bone, muscle, synovial joint and periarticular connective tissues. The changes in muscle of mastication system have been documented following immobilization of mandible. The Cortical and trabecular thinning, vascular distention and increased osteoclastic activity have been described following joint immobilization. Clinical bone union in adults occurs within 4to 6 weeks. But unwanted complications after close or open reduction with MMF in fracture mandible includes bony deformities, trigeminal nerve injury, facial nerve injury, TMJ ankylosis or decrease mouth opening, changes in musculature including muscle atrophy, change in length and function with dental occlusion affection or temporomandibular joint disorder.

Post fractur early Physical therapy rehabilitation is essential for achieving good outcomes that include restoration of pre occlusion, restoration of mouth opening, pain free mouth opening, full range of mandibular excursion, restoration of facial and mandibular symmetry. Condylar fractures lead to violation of articular space, inflammation and hemarthrosis which increases fibrous matrix formation and reduces mandibular movements. Adhesion of the coronoid process and hypertrophy around it, or fibrosis of the temporalis muscle, can be considered as other causes of pseudo ankylosis. The true ankylosis which results from fibrous adhesions or bony fusion is also commonly caused by trauma. The mandibular movement limitations itself may lead to a change in the synovial membrane and reduction in joint lubrication. The muscle weakness and fibrosis may lead to further jaw movement limitation and increased pain.

NEED FOR THE STUDY

Several researchers have investigated the effectiveness of physical therapy in patients with TMD, but there is limited documentation on the effectiveness of physical therapy on TMD post MMF in mandibular sub condylar fracture. This limited documentation may also be due to inaccurate, improper or lack of diagnosis of TMD in post mandibular fracture. However, the importance of physical therapy in them Management of TMD has been recommended by the American Academy of Craniomandibular Disorders and the Minnesota Dental Association. So, finding the effectiveness of physical therapy intervention may heighten the management strategy of TMD post MMF. Hence, the purpose of the study was to investigate the effect of manual therapy, therapeutic exercise and home exercise program in TMD following MMF in sub-condylar mandibular fracture on levels of pain and disability and range of mouth opening and functioning of TMJ.

AIMS:

The aim of the study is to evaluate the Effectiveness of "Movement based approach for TMD in Post Mandibular Fracture".

OBJECTIVES:

- ✓ To Evaluate the Effectiveness of "Movement based approach for TMJ Dysfunction in Post Mandibular Fracture". In relieving pain by using NPRS.
- ✓ To Evaluate the Effectiveness of "Movement based approach for TMJ Dysfunction in Post Mandibular Fracture". In improving jaw range of motion by using MMO (Maximal Mouth Opening)
- ✓ To Evaluate the Effectiveness of "Movement based approach for TMJ Dysfunction in Post Mandibular Fracture". In improving functional disability by using TMJ Disability Index (TDI)

DESIGN & METHODOLOGY

STUDY DESIGN: Experimental study with pre and post study design

STUDY SETTING: The study was conducted at the outpatient department of Physiotherapy, Dhanalakshmi Srinivasan University, under supervision of concerned authority.

TARGET SAMPLE: Age group 19-45 years both male and female.

SAMPLE SIZE: A total number of 10 subjects.

SAMPLING TECHNIQUE: Convenient sampling method.

DURATION OF THE STUDY: 1 year

DURATION OF THE TREATEMENT: 45 mints per day, 5 sessions in two-week duration

INCLUSION CRITERIA:

- ✓ Participants with TMD as post mandibular fracture
- ✓ Age between 19 to 45yrs
- ✓ Both male and female

EXCLUSION CRITERIA:

- ✓ Neurological conditions
- ✓ Bell's palsy
- ✓ Trigeminal neuralgia
- ✓ Chemotherapy undergoing patients.
- ✓ History of sensory deficits in upper extremity
- ✓ Congenital anomalies in upper limb,
- ✓ Upper limb trauma/injury in the past 3 months without recovery,
- ✓ Non-cooperative individuals.
- ✓ Under treatment for acute or chronic cardiovascular, pulmonary, metabolic or vascular disease.

VARIABLES

INDEPENDENT VARIABLES

- ✓ Mulligan Mobilization (MWM)
- ✓ TMJ Dysfunction In Post Mandible Fracture

DEPENDENT VARIABLES

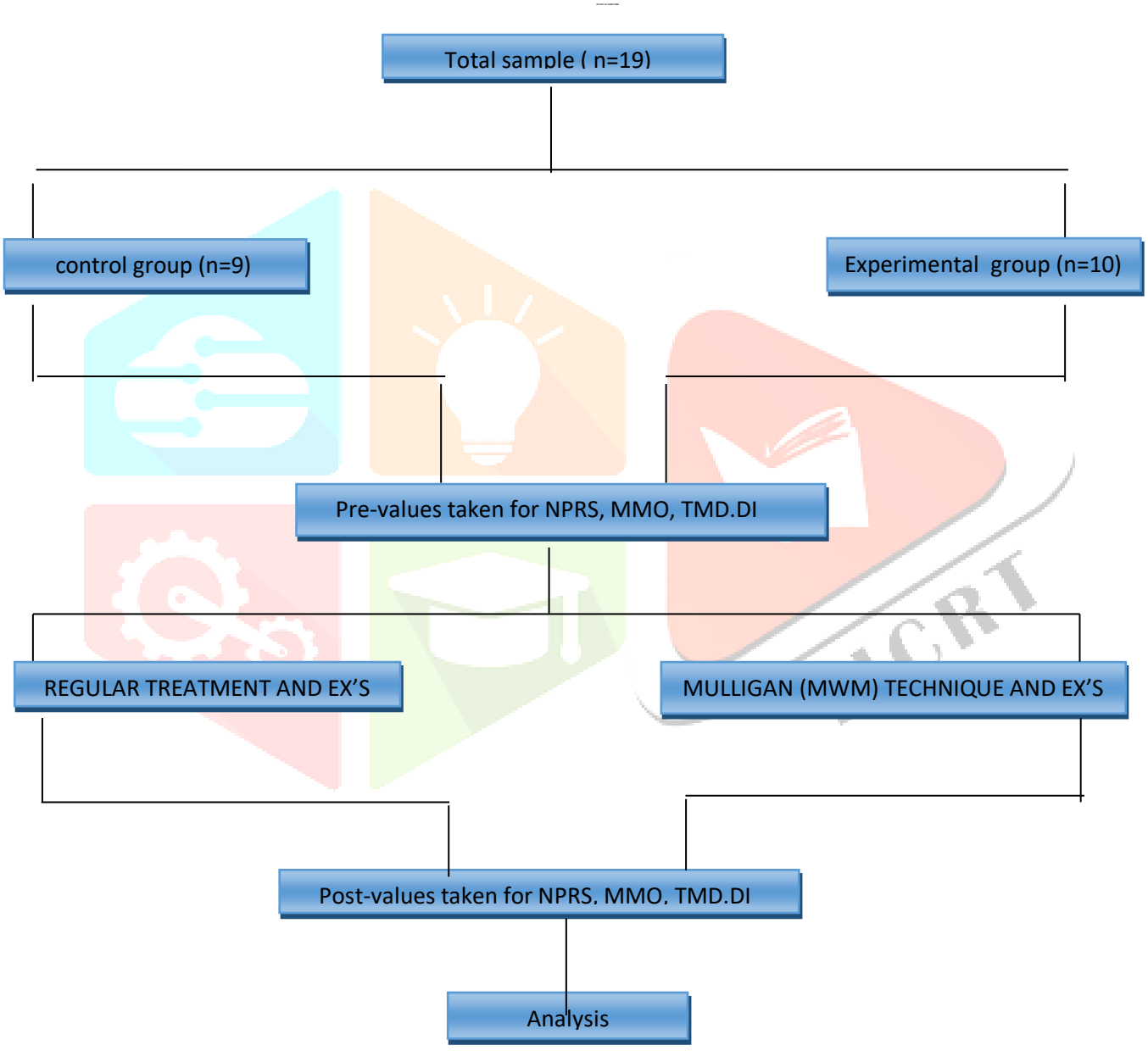
- ✓ NPRS
- ✓ MMO
- ✓ TMJ DISABILITY INDEX

Measurement tools:

The outcome measures were recorded at baseline day 1 and the reassessment Data was recorded at next day of the last intervention.The numerical pain rating scale(NPRS),Range of maximal mouth opening (MMO – Vertical opening), andTMD disability index (TDI) were used as an outcome measure.

METHODOLOGY

This pre-and post-experimental study was conducted on patients with TMJD in post mandible fracture. Participants with TMJ dysfunction, in the age group of 19–45 years, a mouth opening of less than 35 mm, a click, and at least a score of 5 out of 10 on numeric pain rating scale (NPRS) during TMJ movements, and 45–60points on TMJ Disability index were included in the study. Bell's palsy, trigeminal neuralgia, wearing any form of dental prosthesis, having any neurological disorder that affects balance, patients with oral cancer and TMJ discomfort who were undergoing chemotherapy, was excluded from the study. A total of 39 individuals were screened for participation. Twenty participants were eliminated because they did not meet the inclusion requirements. The study involved a total of 19 participants. 10 [participants were taken for the experimental study and 9 participants on control study. Among 19 participants 7 are female and 12 are male. The participants were informed about the trial and were offered treatment after obtaining the informed consent. Pre-treatment assessment of all outcome measures was done.



Experimental Procedures:

The patient visited department 5 times over the period of 15 days. During the study period they went through2 phases, PHASE I (data collection) and PHASE II (Treatment). PHASE I - DATA COLLECTION in both the groups. The phase-I (A) which included the first baseline evaluation and for the purpose of data collection. The phases I (B) reassessment data, initiated at the last visit of the treatment. PHASE II – TREATEMENT consisted of 5 physical therapy treatment sessions over the period of 2 weeks approximately 45 minutes. In an attempt to control external variables, the patient was consistently scheduled at same timings for both data collection and treatment session.

TECHNIQUE – MOVEMENT WITH MOBILIZATION FOR TMJ DYSFUNCTION

PROCEDURE

The therapist stood behind the seated patient, placing their palms on both sides of the patient's head, with the thumbs over the zygomatic arches, to stabilize the head. The index fingers were placed parallel and immediately anterior to the posterior border of the mandible, passing over the TMJ. The third and fourth fingers of each hand were positioned behind the posterior border of the ramus of the mandible, just above the mandibular angle. This hand placement allowed the therapist to apply transverse force across the mandible as necessary, while at the same time allowing an anterior-inferior gliding force to the mandible on the side of restriction, while also controlling the unrestricted side inhibiting any excessive mandibular forward gliding with the other hand. The combination of these manual forces allowed the mandible to maintain a midline position during mouth opening and enabling a larger range of jaw motion. The therapist could select one or several different glide directions, depending on offending or the painful movement. In case of a pain-free movement, the glide was performed three times with 6–8 repetitions. The patient applied the overpressure with his fingers on the chin when the patient opened the mouth, supporting the force for 3 sec.

DOSAGE -TMJ MWM dosage included 3 sets of 6–8 repetitions immediately, after which the outcome measures were recorded (post treatment).

HOME EXERCISES PROGRAM

EXERCISE	DESCRIPTION
Active ROM Exercise	Mouth opening, deviation & protrusion, 10 repetition, 3 sets each in front of the mirror
Resistance Exercise	Manual resistance mouth opening, deviation & protrusion, 10 repetition, 10 sec hold, 3 sets each in front of the mirror
Stick Exercise	Mouth opening with sticks for 10-15 min twice/day in supine, pillow under shoulder blades
All the home exercise were performed 10 repetition with 5-10 sec of holding time, thrice a day, six day in a week, half an hour before the food in front of the mirror throughout the rehab6+ilitation	

STRUCTURED EXERCISES

1. **Relaxed jaw exercise**
2. **Goldfish exercises (partial opening)**
3. **Goldfish exercises (full opening)**
4. **Chin tucks**
5. **Resisted opening of the mouth**
6. **Resisted closing of the mouth**
7. **Tongue up**
8. **Side-to-side jaw movement**
9. **Forward jaw movement**

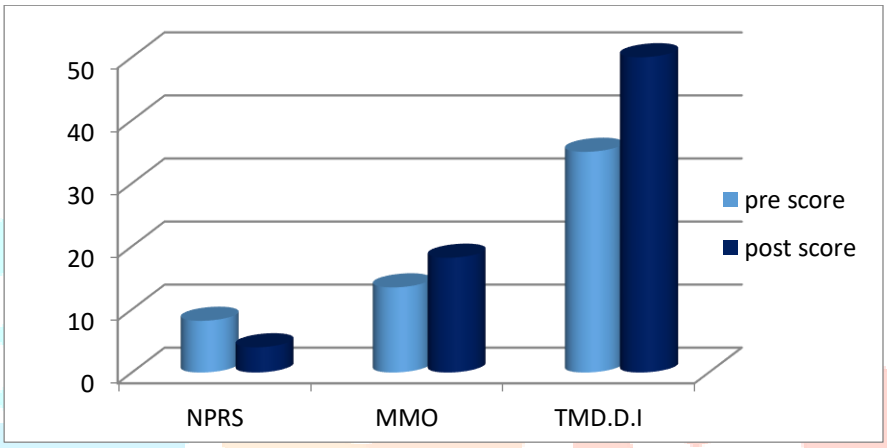
DATA ANALYSIS

CONTROL GROUP

TABLE 1 REPRESENTS THE PRE AND POST TEST VALUES OF NPRS, MMO, TMJ DISABILITY INDEX

TOOL	N	MEAN		SD		df	Std err. df	T value
		pre	post	pre	post			
NPRS	9	8.2	4	.97	.50	8	0.32	13
MMO	9	13.5	18.2	3.5	3.7	8	0.64	7.2
TMJDI	9	35	50	4.6	5.8	8	2.07	7.2

GRAPH 1 REPRESENTS PRE AND POST TEST VALUES OF NPRS, MMO AND TMD.DI OF CONTROL GROUP



EXPERIMENTAL GROUP

TABLE 2 REPRESENTS THE PRE AND POST-TEST VALUES OF NPRS, MMO, TMJ DISABILITY INDEX OF EXPERIMENTAL GROUP

TOOL	N	MEAN		SD		df	Stderr.df	T value
		pre	post	pre	post			
NPRS	10	8.4	1	1	0.82	9	0.2	27.8
MMO	10	15.1	41.6	5.6	3.6	9	1.8	12.8
TMJDI	10	45	83	6.5	4.5	9	2.4	15.5

GRAPH 2 REPRESENTS PRE AND POST TEST VALUES OF NPRS, MMO AND TMD.DI OF EXPERIMENTAL GROUP

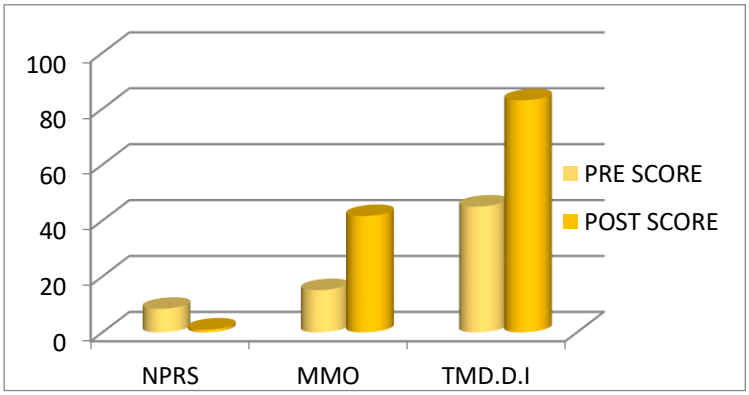


TABLE 3 REPRESENTS PRE AND POST TEST VALUES OF NPRS OF CONTROL AND EXPERIMENTAL GROUP

NPRS	PRE-TEST	POST-TEST
CONTROL GROUP	8.2	4
EXPERIMENTAL GROUP	8.4	1

GRAPH 3 REPRESENTS PRE AND POST TEST VALUES OF NPRS OF CONTROL AND EXPERIMENTAL GROUP

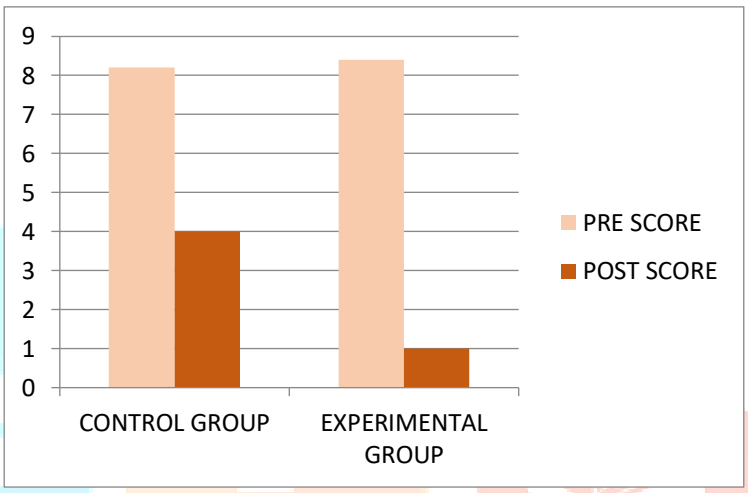


TABLE 4 REPRESENTS PRE AND POST TEST VALUES OF MMO OF CONTROL AND EXPERIMENTAL GROUP

MMO	PRE-TEST	POST-TEST
CONTROL GROUP	13.5	18.2
EXPERIMENTAL GROUP	15.1	41.6

GRAPH 4 REPRESENTS PRE AND POST TEST VALUES OF MMO OF CONTROL AND EXPERIMENTAL GROUP

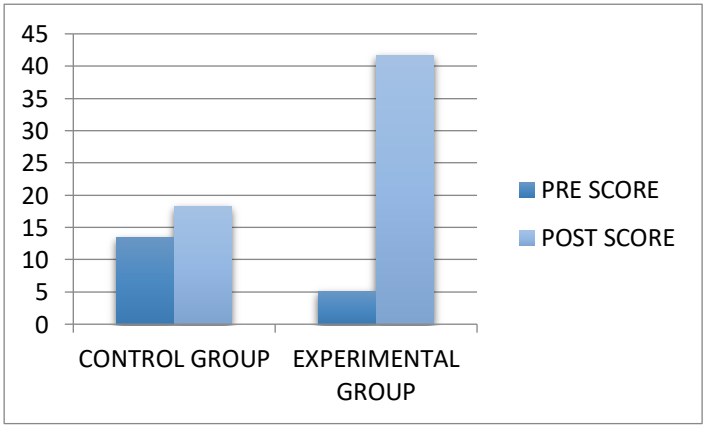
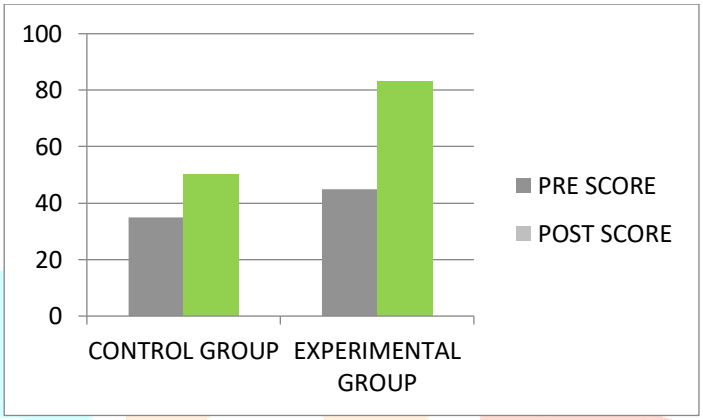


TABLE 5 REPRESENTS PRE AND POST TEST VALUES OF TMJDI OF CONTROL AND EXPERIMENTAL GROUP

TMD.DI	PRE-TEST	POST-TEST
CONTROL GROUP	35	50
EXPERIMENTAL GROUP	45	83

GRAPH 5 REPRESENTS PRE AND POST TEST VALUES OF TMJDI OF CONTROL AND EXPERIMENTAL GROUP



RESULT

Visual analysis of NPRS, MMO, TDI demonstrated are conducted in the variability of data point from the A to B on phase - I, suggesting the data points in the B phase were more stable comparing the phase I A.

Table I show the change in the mean level was noted between the data point of **CONTROL GROUP** phase I A (NPRS=8.2, MMO=13.5 mm, TDI=35, to the point in the phase I B(NPRS=4, MMO=18.2mm TDI=50,). with standard deviation of phase I A (NPRS=0.97, MMO=3.5, TDI=4.6,) and changes in phase I B (NPRS=0.52, MMO=3..7, TDI=5.8,) and the difference of 8 , std error diff of 0.32, 0.64, 2.07 and t value of 13, 7.2, 7.2 respectively,

Table 2 shows the mean level of the data points in **Experimental group** phase I A (NPRS=8.4, MMO=15.15mm, TDI=45,) changes in phase I B (NPRS=1, MMO=41.6mm, TDI=83,) , with standard deviation of phase I A (NPRS=1, MMO=5.6, TDI=6.5,) and changes in phase I B (NPRS=0.82, MMO=3..6, TDI=4.5,) and the difference of 9 , std error diff of 0.2, 1.8, 2.4 and t value of 27.8, 12.8, 15.5 respectively, suggesting a change in NPRS, MMO, TDI score after implication of the intervention.

Table 3 showed the mean difference of pre and post values of NPRS o control and experimental group pre value 8.2 and post value 4 in control group and pre value 8.4 and post value 1 in experimental group respectively.

Table 4 showed the mean difference of pre and post values of MMO of control and experimental group, pre value 13.5 and post value 18.2 in control group and pre value 15.1 and post value 41.6 in experimental group respectively.

Table 5 showed the mean difference of pre and post values of TMD.DI of control and experimental group, pre value 35 and post value 45 in control group and pre value 50 and post value 83 in experimental group respectively.

There were change in the trend in NPRS (A=stable, B=decelerating), MMO (A=stable, B=accelerating), TDI (A=stable, B=decelerating), indicating greater rate of change in the treatment phase. The scores at the last session of B phase were NPRS=2, MMO=35mm, TDI=2 respectively. The2-SD band method analysis of NPRS, MMO, TDI revealed 5 successive data points in phase I B fallout side the 2-SD line, suggesting

a statistically significant reduction in pain and disability while maximized maximum mouth opening and function of TMJ were achieved after treatment phase.

DISCUSSION

The purpose of this study was to assess the effect of MWM in persons with TMJD. Nineteen patients were administered MWM directed at the TMJ. The results confirmed the alternative hypothesis that there will be a change in the effect of MWM on TMD in post mandible fracture.

The result showed the significant difference in pre and post value of all the measuring tools NPRS, MMO, TMDDI of control and experimental group. Which shows that the intervention programme of manual therapy involving mulligan technique in the intervention of tmj dysfunction after mandible fracture has greater influence in relieving pain, improving range of opening of mouth and functional ability in TM joint. The result also showed the difference on comparing the group control and experimental. This showed a very significant difference in thedata.
A prospective case series using mobilization with movement, revealed improvements in pain, dysfunction, and range of motion of the mouth. MWM's mechanism of action is the correction of a flaw in the joint position with the MWM glide. TMJ articular disc displacement can occur in either direction; however, it most usually occurs anteriorly during mouth opening. The rectification of this positional problem at the joint might be the cause of this pain reduction.

There was a considerable improvement in the individuals' maximal mouth opening. This is because of motor control regulation. Information from the muscle spindle is essential to maintain the normal posture of the mandible and movements. To summarize, neurons in the brainstem must work to assist maintain the posture of the jaw and the muscular actions. During normal jaw movements, there is a strong link between the temporo mandibular and cranio cervical motor systems, as well as the brainstem, sub cortical, and cortical centres. Thus the MWM improves the mobility of mouth and improves the functional ability.

CONCLUSION

The study hypothesized that the Manual therapy MWM interventions would alter the levels of pain, range of mouth opening and functioning in patients with TMD in post mandibular fracture. Thus the study concluded that, the Movement Based Approach is effective for TMD in post mandibular fracture.

LIMITATIONS

- ✓ The study had certain limitations as other experimental study designs.
- ✓ The study did not have reliable tools to measures disability, muscle strength and function of jaw.
- ✓ The observation period could have been longer to record the long-term benefits.
- ✓ The study was done only in patients with TMD after post mandibular fracture. The study cannot comment on change in TMJ joint space after the intervention as radiographic comparison was not done.
- ✓ The study being conducted on nineteen subjects, its result can’t be generalized for the management of TMD following MMF.
- ✓ Apart from certain limitation, the study provides the evidence of the effectiveness of physical therapy intervention in the form of manual therapy, therapeutic exercise and home exercise program in TMD post MMF in mandibular sub-condylar fracture.

RECOMMENDATIONS

- ✓ Further studies are warranted for TMD intervention in post mandibular fracture, with larger sample size.
- ✓ Longer period of observation.
- ✓ More reliable investigative methods (MRI) and measuring tools can be used.
- ✓ Future randomized control studies are necessary to compare the effectiveness of different physical therapy intervention such as MET, MAITLAND, MWM in TMD following MMF in sub-condylar fracture subjects.
- ✓ Follow up of study can be done

REFERENCES

1. Margaret L McNeely, Susan Armijo Olivo and David J Magee. A Systematic Review of the Effectiveness of Physical Therapy Interventions for Temporo-mandibula r Disorders. Phys Ther. 2006; 86(5): 710-725.
2. Walker N ,Bohannon R W, Cameron D. Discriminant validity of temporomandibular joint range of motion measurements obtained with aruler. J Orthop Sports PhysTher. Aug 2000;30(8):484-92.
3. Maria Alexandra Ferreira-Valente, José Luís Pais-Ribeiro, Mark P. Jensen. Validity of four pain intensity rating scales.PAIN.Oct2011;152(10):2399–2404.
4. Farrar J T, Young J P Jr, LaMoreauxL, WerthJ L, PooleRM. Clinical importance of changes in chronic pain intensity measured on an 11 point numerical pain rating scale. Pain. Nov 2001;94(2): 149–58.
5. Jessica A. Palmer, Joshua A .Cleland. Effectiveness of manual physical therapy, therapeutic exercise ,and patient education on bilateral disc displacement with out reduction of the temporomandibular joint: A single-case design. J OrthopSports Phys Therapy. sept2004;34(9):535-548.
6. EricS .Furto, Joshua A. Cleland ,Julie M. Whitman, Kenneth A. Olson. Manual Physical Therapy Interventions and Exercise for Patients with Temporomandibular Disorders. Cranio. 2006; 24(4):283-291.
7. Harry von Piekartz, Julius Schwiddessen, Lukas Reineke, Susan Armijo-OlivioInternational consensus on the most useful assessments used by physical therapists to evaluate patients with temporomandibular disorders: A Delphi study. 09 March 2020
8. Aroldo dos Santos Aguiar, Helen Cristina Nogueira Carrer, Mariana Romano de Lira, Gabriela Zuelli Martins Silva, and Thais Cristina Chaves Patient-Reported Outcome Measurements in Temporomandibular Disorders and Headaches: Summary of Measurement Properties and Applicability. J Clin Med. 2021 Sep; 10(17): 3823
9. Gopal Nambi, Walid Kamal Abdel basset, Efficacy of Maitland joint mobilization technique on pain intensity, mouth opening, functional limitation, kinesio phobia, sleep quality and quality of life in temporomandibular joint dysfunction following bilateral cervico facial burns. randomized controlled trait. Pub med 2020 Dec;46(8):1880-1888.
10. Jessica A. Palmer, Joshua A .Cleland. Effectiveness of manual physical therapy, therapeutic exercise ,and patient education on bilateral disc displacement with out reduction of the temporomandibular joint: A single-case design. J OrthopSports Phys Therapy. sept2004;34(9):535-548.
11. Maria Alexandra Ferreira-Valente, José Luís Pais-Ribeiro, Mark P. Jensen. Validity of four pain intensity rating scales.PAIN.Oct2011;152(10):2399–2404.
12. Harry von Piekartz, Julius Schwiddessen, Lukas Reineke, Susan Armijo-OlivioInternational consensus on the most useful assessments used by physical therapists to evaluate patients with temporomandibular disorders: A Delphi study. 09 March 2020