

Efficacy of Muscle Energy Technique (MET) for Hand Function in Rheumatoid Arthritis

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Abstract

Background: Rheumatoid Arthritis is a rare condition which affects only 1% population in India. It is an autoimmune and chronic inflammatory condition which affects joints and organ system. And as it is also a progressive disease so medication and physiotherapy is must for stopping from further worsening of condition. This research aims to find out efficacy of Muscle Energy Technique for hand function in rheumatoid arthritis.

Methods: 50 Rheumatoid arthritis patients were chosen considering the inclusion and exclusion criteria. The purpose and nature of study was explained to the participants, a consent form being filled by the participants. The study was carried out by taking assessment of range of motion and VAS and then the treatment regime was started and after completing the treatment protocol assessment was taken again. The assessment which was collected was entered into a database on Microsoft excel and word.

Conclusion: Based upon the pre-post treatment assessment done and its data collection, the RA patients are prone to get their Range of Motion and Muscle Strength to get affected which also hampers their daily activities. The awareness regarding the condition, preventive methods and even exercise protocol are very helpful in avoiding further risk factors.

Keywords: Rheumatoid Arthritis, Muscle Energy Technique, Range of Motion, Muscle Strength.

Introduction

Rheumatoid Arthritis (RA) is an autoimmune and chronic inflammatory disorder which affects joints and organ systems. RA is also a progressive disease. It most commonly affects the small joints but can also affect to large joints and major organs in severe cases¹. In severe cases this spreads from small joints till skin and lungs also. Now as RA is

autoimmune process in this the immune system attacks bodies own cells. It is triggered by genetic as well as environmental factors. When RA is triggered due to genetic factor it is due to the gene HLA-DR4. The individuals who have these genes are more likely to develop RA². Sometimes it can also triggered by some environmental factors such as smoking, alcohol intake, obesity and poor diet. But when compared

the genetic factor is more severe than environmental factors³. RA affects about 1% population in India. It is mostly seen in 30-50 years of age groups and women are likely to get affected than men⁴. As, said earlier that RA is progressive disease, so if it is left untreated it can cause severe damage to joints and also to major organs which will affect your quality of life and also your daily activities will be hampered⁵. In RA the subjects usually have morning stiffness which usually lasts for more than an hour. This morning stiffness is also seen in OA but this usually goes off within 15-30 minutes but that's not the case in RA. The swelling of joints and pain at joints in night is also seen⁶. Individuals with RA of hand usually have polyarthritis i.e. more than 5 joints are affected and usually small joints of hand are affected⁷. It affects symmetrically to both hands. In this wrist and MCP is commonly affected and also the PIP joint which is also very commonly affected but for the DIP joint it is very rarely affected⁸.

In RA of hand the individuals experience reduced range of motion and reduced muscle strength which affects their daily activities. When there is reduced range of motion there occurs spasticity, rigidity, hypertonicity or hypotonicity. Hypertonicity often follows overuse and can result in altered joint position, increased irritability and decreased elasticity and if it is left untreated the condition may get very severe affecting the joints causing joint deformity⁹. The joint deformities which are caused due to RA of hand are radial deviation of wrist and ulnar deviation of MCP joint, swan neck deformity and sometimes boutonniere's deformity is also seen. And for RA when coming to treatment approach medications and physiotherapy is given which is very effective because it can lower the severity and suppress the symptoms. The medication can be used to for relieving pain and inflammation but to increase strength and improve range and correction of deformity physiotherapy is given¹⁰.

Muscle Energy Technique (MET) has been defined as a form of osteopathic manipulation treatment in which patients muscles are actively used on request, from a previously controlled position in a specific direction and is against the distinctly executed counter force. Thus MET is muscle relaxation technique in which manual resistance is

applied against the active contraction of muscle in the form of isometric or isotonic contraction which may be followed by gentle stretch¹¹.

MET is used to mobilize joints in which movement is restricted, stretch the tight muscles and fascia, to improve local circulation and strengthening of muscles. MET thus improves musculoskeletal function through mobilizing joints and stretching of tight muscle and fascia to reduce pain and to improve circulation. So if there is severe pain because of severe muscle spasm or trigger points or any restriction in joints then MET is the best treatment which should be administered. This results in reducing edema, muscle relaxation, lengthening of shortened muscle and also increasing ROM¹². But in unco-operative or unresponsive patients MET is not given¹³.

MET is a manual therapy technique where muscle uses its own energy in the form of isometric contraction to relax the muscle using its two methods i.e. autogenic or reciprocal inhibition which is used to lengthen the muscle. MET is an active technique in which patients actively use their muscle on request for the sake of treatment. MET is based on the concept of autogenic inhibition and reciprocal inhibition. When there is contraction followed by stretching of same group then it is autogenic inhibition MET. But when there is contraction of muscle group and stretching of other muscle group then it is a reciprocal inhibition MET¹⁴.

As the primary function of MET is to reduce pain and increase range of motion. In this the therapist will resist the desired muscle while the subject will contract it and push against the therapist. This contraction is held for 5-10 seconds and this is repeated for a several times with short rest periods. So in those patients who have spastic muscle or chronic tightness or post-surgery stiffness this technique will help reduce tone and regain the normal range. This technique can be applied to any joints. And when we aim to improve range patients effort should be 10-20% of available strength¹⁵.

Reciprocal inhibition is an indirect manual therapy technique. This muscle energy activation utilizes the reflex mechanism of reciprocal inhibition when antagonistic muscles are contracted. In this the agonist muscle which are shortened or tensed

are not allowed to contract because pain prevents against muscle to contract. Therefore opposite group of muscle (antagonist) are allowed to contract isometrically or isotonicly against resistance which causes reciprocal inhibition or relaxation of shortened muscle¹⁶.

Post-isometric inhibition is also called as lewit's PIR. In this immediately following an isometric contraction the NM apparatus is in refractory state during which passive stretching may be performed without encountering strong myostatic reflex. The subject is asked to do is resist the contraction and then take up the slack in fascia during relaxed refractory period. With muscle contraction there also maybe increased tension in golgi organ proprioceptors in the tendons which inhibits active muscle contraction. As the name suggests that "physiological relaxation of muscle after isometric contraction". It is the types of hold relax exercise in which the contracted or tensed muscle is allowed to contract against the manual resistance. And patient is allowed to use 10-20% of his/her available strength¹⁷. Post-facilitation stretch technique or Janda's post-facilitation stretch method is generally used to elongate muscle length as well as to relax the muscle¹⁸. As the name suggests a stretch is given to the muscle just after the contraction. In this also 10-20% patient effort available strength is used¹⁹.

Methodology

A cross-sectional study was carried out from in a rural tertiary care hospital in karad. This study included rheumatoid arthritis patients with reduced mobility and strength of hand. An assessment was made for this purpose. Patients who were cooperative, patients who were willing to participate considering the inclusion and exclusion criteria were included in the study. A consent form was signed by the participants before taking their assessment and all the details explained in Marathi. The respondents were informed about the aim of the study as well as the fact that participation in the study was totally voluntary. The data collection sheet consisted of assessment in which range of motion and VAS was assessed in patients with RA in karad. The assessment was validated by the experts from Institutional Ethics Committee. An Assessment was performed using ROM and VAS. An assessment of ROM was

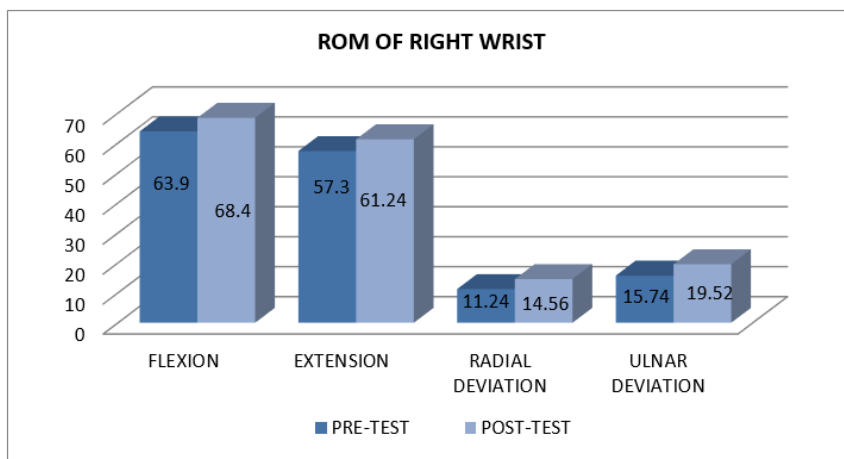
performed with the measurement of subjects Wrists, MCP ranges. Similarly, for VAS, subjects were asked about their pain scoring at rest and on activity and the score was documented. All the data were entered in database on the Microsoft excel. Microsoft excel and Microsoft word have been used to generate the graphs. The treatment session was started after the complete assessment was taken.

Treatment

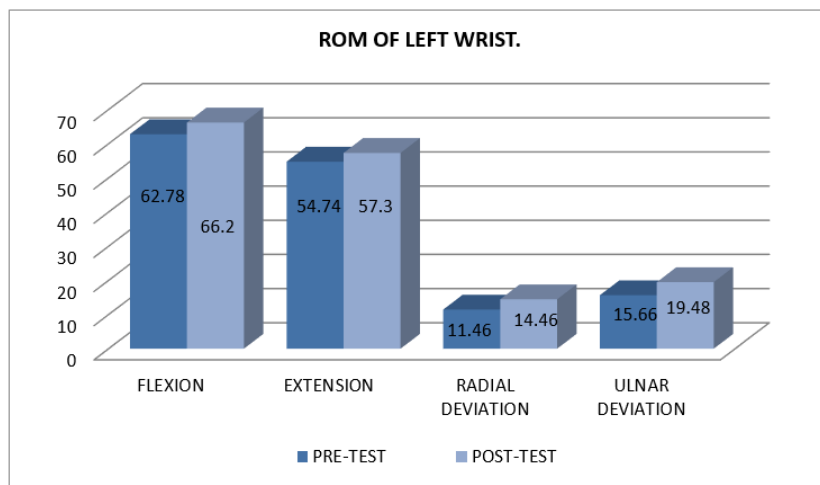
- Hot Moist Pack for 10 minutes
- Muscle Energy Technique -
 1. Autogenic Inhibition- Post Isometric Relaxation (PIR)
 - Post Facilitation Stretching (PFS)
 2. Reciprocal Inhibition
- ❖ Post-Isometric Relaxation (PIR) :
 - The tensed or spasmed muscle was lengthened into restricted ROM. Then the limb was held firmly but comfortably and patient was allowed to use his muscle against the manual resistance applied by therapist and also allowed taking deep breath during contraction.
 - The contraction was allowed for 5-10 sec.
 - Then the patient was instructed to relax the muscle and exhales then muscle was again stretched into restricted ROM just short of pain and again the same was repeated after 20sec rest and this procedure was repeated for 3-5 times.
 - And also patient was asked to use their 10-20% of strength in order to improve range.
- ❖ Post-Facilitation Stretching (PFS) :
 - The tensed muscle was placed between a fully relaxed and fully stretched state.
 - Limb was held firmly but comfortably and patient was instructed to contract the tensed or shortened muscle for 5-10sec and then allowed to relax the muscle

- And now as the muscle is relaxed a rapid stretch was given to tensed or relaxed muscle into restricted ROM (new position) held for 10 sec after which 20 sec rest was given.
 - This procedure was repeated for 3-5 times.
 - And also patient was asked to use their 10-20% of strength in order to improve range.
- ❖ Reciprocal Inhibition :
- The shortened muscle was placed between a fully stretched or fully relaxed state.
 - The limb was held firmly but comfortably
 - The patient was instructed to contract muscle (which is opposite to shortened or tensed muscle) isometrically or isotonicly against manual resistance for 6-10sec
 - This technique allows agonist muscle to relax without contacting them.
 - This all techniques was being repeated 3-5 times and for 10 seconds of hold with 20 seconds of relaxation.
 - This whole procedure consists of 30 minutes with 10 minutes of HMP and 20 minutes of MET with short breaks in between.

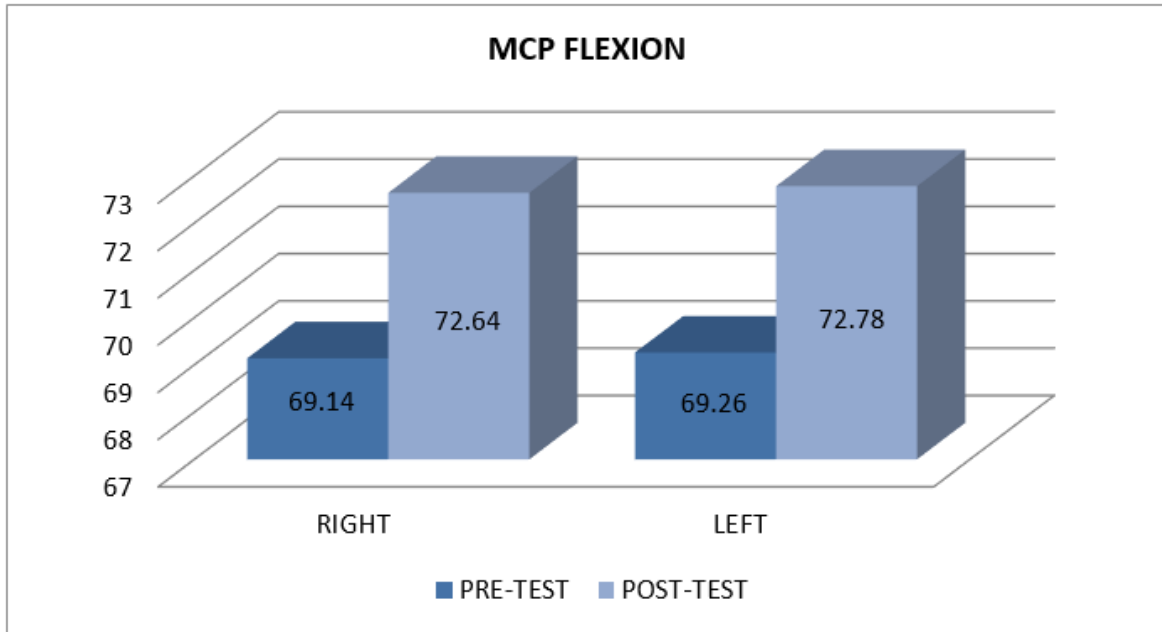
Results



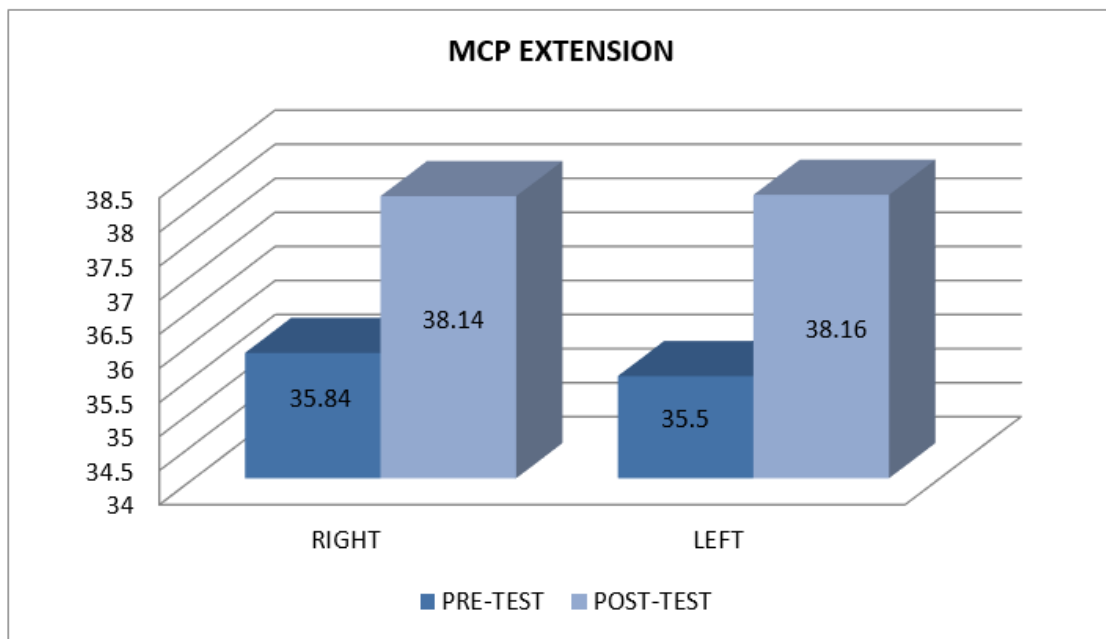
Graph 1: Comparison of pre-test and post-test of ROM of right wrist.



Graph 2: Comparison of pre-test and post-test of ROM of left wrist.



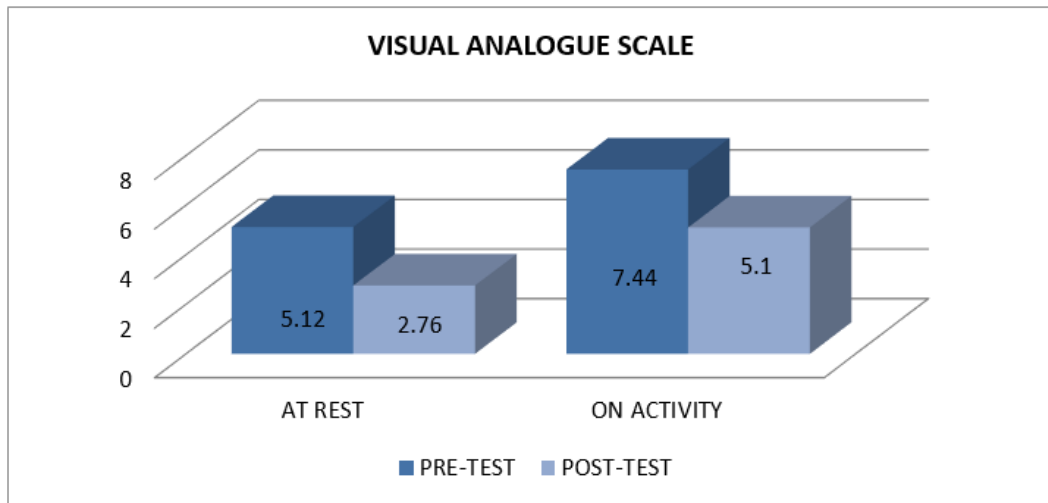
Graph 3: Comparison of pre-test and post-test values of ROM of MCP flexion.



Graph 4: comparison of pre-test and post-test values of ROM of MCP extension.

Interpretation: The above graphs shows the pre-test and post-test values of ROM score for patients with rheumatoid arthritis, for the wrist and mcp joint is extremely significant ($p < 0.0001$). For wrist flexion,

extension, radial deviation and ulnar deviation is extremely significant ($p < 0.0001$) and MCP is also extremely significant with ($p < 0.0001$). For flexion and extension is very extremely significant ($p < 0.0001$).



Graph 5: Comparison of pre-test and post-test values of Visual Analogue Scale.

Interpretation: The above graph shows the post-test versus post-test values of Visual Analogue Scale (VAS) for patients with Rheumatoid Arthritis of hand. It is found to be statistically extremely significant ($p < 0.0001$).

Discussion

In the present study we aimed toward assessing and applying the set treatment protocol to patients with RA who are residing in karad.

The study assessed the severity of rheumatoid arthritis in people whose range of motion and strength is affected. According to the pre-assessment taken groups were divided into mild moderate and severe. The result thus moves our attention towards educating the patients with Rheumatoid Arthritis about the condition and importance of physiotherapy in avoiding further worsening of the condition and also telling about importance of exercise protocol for them, this will help in building a more positive approach among the community dwelling RA patients towards the rehabilitation and seek a good quality of care. Along with increasing awareness among the RA patients, home based exercise protocol should be taught to patients. Proper implementation of this home based exercise protocol and the treatment protocol would ensure a subsequent decrease would stop further worsening of condition, reduction in hospital/rehab costs, and a significantly good quality of life.

Previous studies which have been conducted focuses on stretching and strengthening protocol as a general concept²⁰; this study focuses on the Muscle Energy Technique (MET) for those RA patients who have decreased ROM and decreased muscle strength which is very crucial for rehabilitation and prevention of further worsening of condition. Many previous studies have been done on stretching, strengthening and using various physiotherapeutic modalities and using home protocol but the study focusing on MET has never been done. This project successfully developed a validated treatment protocol for treating the patients with RA of hand. Although the sample size was relatively small, a study with much larger population can demonstrate better outcomes.

Conclusion

According to responses collected, the study indicated very poor knowledge about the condition and preventive measures for same and about further risks if left untreated among the population in karad. This necessitates awareness regarding the knowledge and practice, if such awareness and importance of rehab is created then this will prove helpful in reducing the further risks. The treatment protocol will help in pain reduction and significantly increasing the ROM and muscle strength. This practice would thus lead to an improved quality of life.

Conflict Of Interest: Nil

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