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Effectiveness of Muscle Energy Technique with Free Exercises on Quality of Life in Chronic Rheumatoid Arthritis

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Abstract

Background: Rheumatoid arthritis (RA) is a chronic inflammatory, symmetrical involvement polyarthritis disease. It affects many tissues in the body. The prevalence of RA in women varies from 0.5 to 3.8% and in men 0.15 to 1.37% with peak incidence in fourth decade of life. **Objectives:** The objectives of the study were to determine the effect of muscle energy technique (MET) with free exercise on quality of life (QOL) in chronic RA. **Materials and Methods:** An experimental study was carried out using simple random sampling method during 1 year in Krishna Hospital. Pre- and post-design was used for assessing the study. SPSS software was used for analysis. **Result:** A total of 30 subjects were involved as per inclusion and exclusion criteria and assessed with numerical rating scale (NRS) and health assessment questionnaire (HAQ). There was only one group. There is statistically significant difference with respect to mean value of NRS is (at rest) 1.30 ± 0.46, (on activity) 3.26 ± 0.58 with $P < 0.0001$, and HAQ 1.19 ± 0.25 with $P < 0.0001$. **Conclusion:** This study concluded that MET with free exercises on QOL in chronic RA has shown significant improvement clinically and statistically on QOL and pain.

Keywords: Free exercises, Muscle energy technique, Quality of life, Rheumatoid arthritis
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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory, symmetrical involvement polyarthritis disease. It affects many tissues in the body.[1] The prevalence of RA in women varies from 0.5 to 3.8% and in men 0.15 to 1.37% with peak incidence in fourth decade of life.[2] Rheumatoid factor (RFs) is antibodies specific to immunoglobulin G and is found with the 70% of all patients with RA. Research indicates that the presence of RF affects disease severity, because those who have RF or seropositive disease, has increased frequency of subcutaneous nodules, vacuities, and polyarticular involvement.[3]

In early RA synovial inflammation leads to pain, stiffness, and restricted ROM. As the disease progresses, the joint capsule become inflamed and immune cell degrade the cartilage. In prolonged RA the synovium look like grossly edematous with slender villous or hair like projection in to the joint cavity. Synovial increase of vascular granulation tissue is known as pannus. Eventually with disease progression, the granulation tissue leads to adhesions, fibrosis or bony ankylosis of the joint. Chronic inflammation associated with RA weakens the joint capsule and its supporting ligament such as structures, altering joint structure, and function. Tendon rupture and fraying tendon sheaths produce imbalance muscle pull on pathologically altered joints resulting in the characteristic musculoskeletal deformities seen in advanced RA.[4]

The main feature of RA is chronic synovial inflammation and presence of palpable nodules It involve symmetrical joint edema, bone erosion, and joint cartilage destruction. Symptoms like morning stiffness or pain in proximal interphalangeal joint of hands, metacarpal and metatarsophalangeal joint in the wrist, shoulder and knee are seen. Finger and wrist joints are involved in most patients with RA.[5] Joint stiffness lasting at least 1 h (morning or after long period of immobilization). Decreased strength and muscular endurance and physical deconditioning.[6] Patients presented with limited mobility and signs of inflammation including pain, redness, swelling, and warm joints.[7] Fatigue greatly affects function and participation in daily life and is often underappreciated on physical examination.[8]

The individual perception of their own life culture and value systems in which they live and related goals, expectations, standards, and concerns is defined as quality of life (QOL) by the WHO.[9] Early signs seen are pain and fatigue and these remain stable throughout the course. It is progressed into disability and lead to pain, inflammation and joint damage, and also results in psychological effects.[10] All these effects the QOL of an individual as functional disability also occurs.[9]

In some cases with RA severe joint restriction is noted and yet the surveys indicated that mobility limitations.[9] Two of the most distressing aspects of the condition are pain and fatigue, both of which contribute to joint restrictions experienced by respondents. Progression of the disease varies wherein, mild RA recovers but in other cases it may be severe leading to deformities and impairing Activities of Daily Living (ADLS).[11] QoL also reflect the influences of the individual, social, and financial resources that an individual has, and the way in which these interact with health status. The Health Assessment Questionnaire (HAQ) is the most widely used measure of functional disability in RA. QOL is compromised in patients with RA. Functional disability is the most important

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factor affecting QOL in RA. QOL goes beyond the impairment, disability and handicap continuum by asking what patients' health status prevents them from doing and also about their emotional response to these restrictions. QOL also reflects the influences of the social and economic resources that an individual has, and the way in which these interact with health status.[12]

Muscle Energy Technique (MET) can be used to increase in length and strengthen muscles, to increase fluid mechanics and decrease local edema, and to mobilize a restricted articulation. Mechanism for MET for pain relief is still unknown, although it has been proposed that MET acts on joint proprioceptors and mechanoreceptors that affect on the descending pathways, and changes the motor programming of the target joint. Furthermore, reduction of pain and increased mobility, flexibility and increase in strength tolerance are due to changing visco-elastic properties of the soft tissues followed by application of the technique.[13] While MET has found an increased audience with clinicians, very little has been published in the peer-reviewed literature on this intervention.[10]

MET has been proved beneficial in patients with acute and chronic low back pain, trigger point cervical pain in other muscles culture dysfunction. MET may have been also using in asymptomatic subject to improve mobility there is a varying evidence that when a joint has a function limitation the application of method can be increased range of motion. In the previous study, MET on thoracic spine in asymptomatic subjects presenting with restricted and non-restricted side.[14] It helps to reduce rehabilitation timing, safe, easy to use, effective, and relatively painless. Patient actively participate in the treatment where patient must actively contract and then relax their own muscles.[15] Recently, MET has been proven beneficial in improving musculoskeletal disorders, wherein the affected muscle is stretched for 3–5 s for sub-maximal contraction; encouraging muscle, relaxing, and improving range of motion.[16,17] In a study, MET was implemented for non-specific force of contraction on the lumbar region for a duration of 4 weeks which proved beneficial for improving hamstring passive extensibility. Furthermore, it has aided in improving pain and function.[18] Many people with RA are severely physically restricted.[9] Most of the emphasis in RA is given on physical functioning but there is reflectance to identify the impact of manual techniques on chronocity of RA on ADL.

Manual technique approach to the proximal joints can aid in efficient improvement of hand function utility, improving ADL. As, progression of RA severely affects distal joint mobility due pain, stiffness; prevention of further progression by treating the proximal joints needs to be concerned. Furthermore, this study further focuses on RA patients in preventing the chronicity of dieses progression and improving the quality of life.

Materials and Methods

An ethical clearance was taken from Institutional Ethics Committee of KIMSDU Karad prior initiation of the study. After that concerning subjects with chronic diabetic were approached. The purpose of the study was explained and written consent was taken from subjects willing to participate. Subjects were selected according to the selection criteria. Inclusion criteria were both male and female participants willing to participate in the study, subject diagnosed with RA by certificated orthopedic surgeon or physiotherapist, age group 30–60 years, experiencing symptoms for at least 6 months, Diagnosed with American Rheumatology criteria for RA. Exclusion Criteria were acute case of RA, prior surgery to any joint, prior physiotherapy treatment for same complaint, any other spondyloarthropathy, and any trauma. There was only one group. After inclusion, the procedure was explained. Subjects received treatment for 6 weeks 5 days per week. Pre- and post-assessment was done using numerical rating scale (NRS) and HAQ. These measures were taken before the treatment and after 6 weeks of the treatment. The effect of the treatment given to subjects was noted immediately using the outcome measures. The experimental result was statistically analyzed using SPSS 25 software. After the general characteristics of the subjects were determined, the paired *t*-test was used to compare significant difference between pre and post values.

Results

Statistical Analysis

The outcome measures were assessed at the baseline before the treatment and 6 week after the treatment. The statistical analysis was done using paired t test. The SPSS software was used for the same.

The Table 1 shows a comparison of means value and standard deviation of NRS on activity.

Pre- and post-value was compared by applying the paired *t*-test. The post-intervention assessment shows that there is considered extremely significant (P =< 0.0001, at rest t = 14.29 and on activity t = 19.25).

The Table 2 shows a comparison of means value and standard deviation of HAQ on activity.

Pre- and post-value was compared by applying the paired *t*-test. The post-intervention assessment shows that there is considered extremely significant (P =< 0.0001, t = 16.78).

Discussion

RA is a chronic inflammatory, symmetrical involvement polyarthritis disease. It affects many tissues in the body.[1] The prevalence of RA in women varies from 0.5 to 3.8% and in men 0.15 to 1.37% with peak incidence in fourth decade of life.[2] In the present study, outcome measures for pain intensity and functional disability were NRS and HAQ score.

Keeping this in mind, the present study was conducted in the subjects between age group 30 and 60 years having RA, to find out the effectiveness of MET with free exercises on the QOL in RA. In this present study, there are 26 females and 4 males so female are more affected than male likewise it also supports the proven literature that females are more prone to have RA.

Table 1: Comparison of pre- and post-numerical rating scale

Parameter	*Pre intervention Mean±SD*	*Post intervention Mean±SD*	*P-value*	*t-value*	*Interference*
NRS (At rest)	2.43±0.56	1.30±0.46	<0.0001	14.29	Considered extremely significant
NRS (On activity)	6.9±0.92	3.26±0.58	<0.0001	19.25	Considered extremely significant

SD: Standard deviation, NRS: Numerical rating scale

Table 2: Comparison of Pre- and Post-health assessment questionnaire

Parameter	*Pre-intervention Mean±SD*	*Post-intervention Mean±SD*	*P-value*	*t-value*	*Interference*
HAQ	2.34±0.40	1.19±0.25	<0.0001	16.78	Considered extremely significant

SD: Standard deviation, HAQ: Health assessment questionnaire

In this study, 30 subjects were included with the age group of 30–60 years with the mean age group of 48.53 years. In the previous study, criteria for entry were 20–70 years with the mean age group of 47.94 years.[19] In the present study, pre-interventional NRS value was 2.43 and post-interventional NRS was 1.30 with $P < 0.0001$. NRS value reveals statistically significant reason for reduction in pain score.

Hot moist pack was given for 15 min before exercises for knee and elbow joints. Thermotherapy can be used clinically where the goals are to increase joint range of motion and decrease joint stiffness.[20] Both of these effects are thought to be the result of increasing in soft-tissue extensibility that occurs with increasing soft-tissue temperature. Increasing soft-tissue extensibility contributes to increasing joint range of motion because it results in increasing soft-tissue length when passive stretch is applied. Temperature is maintained at 40–45 degree for 15 min. Evidence supporting the effectiveness of this model is weak but patient reports that they get comfort from moist heat. Participants of the present study felt comfortable after receiving HMP. Moist heat also helps in relaxation of muscles surrounding treated joints and prepares them before manual therapy application.

With the individual's own muscular effort without any external force applied can be performed are known as free exercises. Free exercises are rhythmical or pendular in character which helps in maintaining muscle tone and increasing muscle power according to the speed, leverage and duration of exercise. This type of exercises can be used to obtain any of the effects which are produced by exercise as an entire. Current evidence suggests that exercise does not appear to have a negative impact on the disease process and may in fact be beneficial, including for the small joints. A degree of relaxation can also be induced by free exercises.

Manual therapy may alter the imbalance between facilitatory and inhibitory input, thereby enhancing descending pain modulation. Manual therapy helps in improving function as well as maximum distribution of nutrients to the joints and removes waste. Mobilization leads to superior hypoalgesic effect which reflects in local cellular improvement. Even MET helps in improving reported pain, disability, and joint range of motion in both asymptomatic subjects and symptomatic patients. The studies evaluated in this review have provided evidence that MET specifically effective for alleviating chronic pain.[16] There was also evidence supporting MET is a beneficial therapy for reducing pain and improving the related disability. METs, of which post-isometric relaxation is the mostly applied, are of effect in improving reported pain, improve quality of life, and joint range of motion in RA individuals.

Active participation of the patient is unique part in the treatment. Therapy is normally more effective when the patients taken active part in their own therapy when they are just passive recipients of therapy. Patient who take an active part in helping themselves is also less likely to develop a long-term dependency on continuous treatment.[21]

After given the mentioned treatment, the QOL in patients was found improved, previously which was hampered while performing activities of day-to-day life. Hot moist pack and free exercises with MET were given to the subjects. HMP reduced the muscle pain and maintained the ROM. Where, free exercises with MET increased the endurance as well as mobility and maintained its ROM.

The score of HAQ was high before giving the treatment later on its score was decreased which indicates that the QOL was improved as compared to previous one.

In this study, pre-interventional of HAQ test was 2.34 ± 0.40 and post-interventional mean was 1.19 ± 0.25 shows statistically extremely significant and reducing the pain and improves the QOL of that patient.

In the proven previous literatures, it states that thermotherapy given before exercises and it helps in reducing the muscle pain and joint stiffness. Heating modality in RA showed to help relieve pain and improve joint flexibility.[22] Gentle free active exercises focusing on range of movement and it's moderated with rest breaks. Daily exercises are beneficial and may also help to maintaining quality of life.[23]

Hence, this study states that MET along with free exercises are extremely significant result in chronic RA patients.

Conclusion

This study concluded that MET with free exercises on the QOL in chronic RA has shown significant improvement clinically and statistically on HAQ score, NRS thus facilitating functional outcome.

Thus, the study provided evidence to support that MET with free exercises on QOL in chronic RA has shown significant improvement clinically and statistically on QOL and pain.

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