RESEARCH ARTICLE

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The Efficacy of Stretching and Strengthening Exercises with Task-Oriented Training for Hand Dexterity in Women with Rheumatoid Arthritis

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ABSTRACT

Aim: The aim of this study was to determine the impact of combining strengthening and stretching exercises with task-oriented training on hand dexterity in women with rheumatoid arthritis. **Background:** Rheumatoid arthritis impacts daily activities and quality of life, as diminished hand function, strength, and dexterity hinder many tasks. This study aimed to assess the effects of combining stretching and strengthening exercises with task-oriented training on hand dexterity in women with rheumatoid arthritis. **Methodology:** Twenty-eight participants with rheumatoid arthritis were recruited for the study. They were asked to perform stretching and strengthening exercises combined with task-oriented training six days a week for a duration of 12 weeks. The Visual Analog Scale (VAS) and the Functional Dexterity Test were utilized to assess the participants before and after the treatment protocol. **Results***:* In this study, stretching and strengthening exercises enhanced hand muscle strength and alleviated pain. Task-oriented training improved the quality of life and Activities of Daily Living (ADLs). Hand exercises were found to be beneficial in increasing strength without worsening disease activity. **Conclusion:** This study demonstrates that incorporating task-oriented training into the treatment plan for rheumatoid arthritis can enhance hand dexterity and facilitate activities of daily living. Additionally, stretching and strengthening exercises may be beneficial in improving strength and alleviating pain.

Keywords: ADLs, Arthritis, Dexterity, Task-Oriented Training

1. Introduction

Rheumatoid Arthritis (RA) is a chronic, symmetric polyarthritis that can affect most synovial joints, particularly the small joints of the hands, wrists, and feet. In 80 to 90 % of individuals with RA, the metacarpophalangeal and proximal interphalangeal joints of the hand, as well as the wrist joints, are involved. The global prevalence of RA is estimated to be between 0.3% and 1%, with a higher incidence in women from developed countries. In India, the prevalence is estimated to be 0.75%[1].

Rheumatoid arthritis patients frequently have impaired hand function, which negatively impacts everyday tasks and quality of life. Hand function declines at an early age. While many daily duties are affected by the disease's course and the reduced strength and dexterity[2].

RA, inflammation, discomfort, stiffness, fatigue, joint deformity, decreased joint mobility, and hand strength issues can impede everyday tasks. These challenges not only limit the ability to carry out daily activities but

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also restrict participation in home, work, family, and community engagements[1-3].

While there isn't a cure for the illness, there are growingly efficient medication therapies that can lessen its effects, most notably Disease-Modifying Anti-Rheumatic Medications (DMARDS).

Reduce discomfort, optimize function, and avoid or control joint deterioration are the main objectives of care[3].

Hand function holds significant importance for individuals living with RA. Physiotherapy is often considered a crucial component of managing the condition in patients with rheumatoid arthritis.

Exercise therapy, joint protection guidance, and the provision of functional splints and assistive devices are the primary components of physiotherapy for managing rheumatoid arthritis in the hands[4].

Many hand exercise programs designed for arthritis patients typically focus on enhancing hand and wrist joint flexibility or strengthening grip and hand muscles. However, aspects like dexterity are often overlooked in these programs[1-4].

Proficiency in handling and manipulating objects with the fingers and hands is crucial for nearly all daily activities, including eating, dressing, grooming, and engaging in play, hobbies, and household chores[1-5].

Task-Oriented Training (TOT) offers a simple and practical approach that allows individuals to exercise using real-life objects, engaging in functional movements relevant to daily activities. This method aims to enhance endurance and intensify practice through meaningful tasks.

Task-oriented training has demonstrated effectiveness in enhancing upper extremity function and the capacity to carry out Activities of Daily Living (ADLs) among chronic hemiplegic stroke patients, even those with impaired cognition[6].

The Task–oriented training is mostly offered to stroke patients, thus the number of studies on the effect TOT on individuals with RA is limited.

Task-oriented training has proven effective in improving upper extremity function and the ability to perform Activities of Daily Living (ADLs) in chronic hemiplegic stroke patients, including individuals with impaired cognition[1-6].

Till date no study has reported the use of task-oriented approach as a part of their treatment intervention in women with Rheumatoid arthritis affecting the hand.

Therefore, the main objective of the study is to assess the effectiveness of task-oriented training in women diagnosed with rheumatoid arthritis.

1.1 Aim

To find effect of strengthening and stretching exercises with task-oriented training for hand dexterity in women with rheumatoid arthritis.

1.2 Objectives

- To find the effect of strengthening and stretching exercises in women with RA.
- To find the effect of task- oriented training in women with RA.

1.3 Materials and Methods

The study was carried out at the Krishna Institute of Medical Sciences 'Deemed to be' University in Karad. Ethical clearance was obtained from the Institutional Ethical Committee of the university. Subjects were selected using a simple random sampling method based on specific inclusion and exclusion criteria. All subjects provided informed written consent. A total of 28 subjects were included in the study.

Prior to the intervention, pre-test assessments including the Visual Analog Scale (VAS) and the Functional Dexterity Test (FDT) were conducted to evaluate the patients. The time taken to perform the dexterity test for both hands was recorded.

Subjects were then instructed to engage in stretching and strengthening exercises using task-oriented training for six days a week over a period of three months.

Following the initial assessment, the exercise program incorporated various activities such as rubber band exercises, squeeze ball exercises, towel curls, thumb opposition, finger extension, wrist circumduction, and more. The task-oriented training involved practical tasks like using a spoon, lacing and unlacing shoes, fastening and unfastening buttons, opening tight jars, locking and unlocking doors, writing with a pen, cutting with scissors, pulling up zippers, holding spherical or cylindrical objects, and using taps.

Over the six-week period, the number of exercise repetitions and hold times were progressively increased. Upon completing the protocol, post-test assessments, including the VAS and Functional Dexterity Test (FDT),

were conducted to evaluate the patients. The time taken to perform each activity was again measured and documented.

The collected data was analysed, and the results were interpreted by comparing the pre-test and post-test assessments. Statistical analysis was performed on the recorded data to draw conclusions regarding the effectiveness of the intervention based on both outcome measures.

2. Statistical Analysis

- Statistical analysis of the recorded data was done by using the software Instat.
- Percentages for each demographic variable was calculated.
- Data was calculated.
- MS Excel was used for drawing various graphs with given frequencies and for master chart.
- The two tailed p value for Hand Dexterity test and VAS was > 0.10

2.1 Result

Table 1. Average score of visual analogue score pre and post in RA.

	PRE		POST	
	AT REST	ON ACTIVITY	AT REST	ON ACTIVITY
MEAN	6.4071	5.4464	2.1821	1.4035
SD	1.890	1.453	1.217	0.9597
P VALUE	>0.10	>0.10	>0.10	>0.10

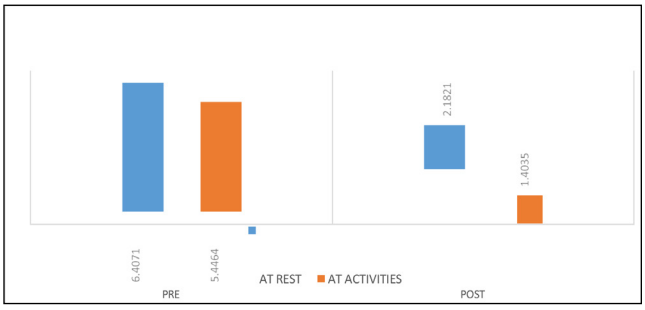


Figure 1. Comparison average pre and post of visual analogue scale in RA.

2.2 Interpretation

Figure 1 illustrates the pain outcomes of rheumatoid arthritis in the hand. Before treatment, the Visual Analog Scale (VAS) scores were 6.4071 at rest and 5.4464 during activity. After treatment, the VAS scores decreased to 2.182 at rest and 1.4035 during activity. This graph clearly demonstrates that post-treatment pain levels are lower than pre-treatment levels, indicating a decrease in pain following the intervention.

Table 2. Average score values of hand dexterity test pre and post in RA

	PRE		POST	
	LEFT	RIGHT	LEFT	RIGHT
MEAN	45.42	41.03	33.46	29.75
SD	7.259	6.669	2.472	2.084
P VALUES	>0.10	>0.10	>0.10	>0.10

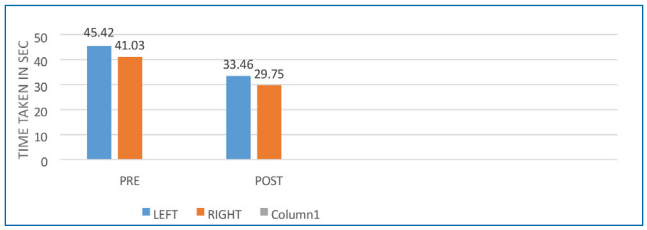


Figure 2. Comparison of pre and post values of functional dexterity test in RA.

2.3 Interpretation

Figure 2 displays the pre and post-treatment values of the Functional Dexterity Test (FDT), showing the average time taken to complete the pegboard test in seconds for both the left and right hand. Before treatment, the average time taken for the left hand was 45.42 seconds, and for the right hand, it was 41.03 seconds. After treatment, these times decreased to 33.46 seconds for the left hand and 29.75 seconds for the right hand, respectively. The graph clearly indicates that the average time taken to complete the test improved and reduced significantly after the treatment, demonstrating an enhancement in hand dexterity.

3. Discussion

Rheumatoid Arthritis (RA) is a chronic condition characterized by symmetric polyarthritis, which commonly affects the small joints of the hands, wrists, and feet. In 80 to 90% of individuals with RA, the joints involved include the metacarpophalangeal and proximal

interphalangeal joints of the hands, as well as the wrist joints[7].

It's common for individuals with Rheumatoid Arthritis (RA) to experience impaired hand function, which significantly impacts daily activities and quality of life. This reduction in hand function often manifests early in the disease progression, and the resulting weakened strength and diminished dexterity can affect various routine tasks[8].

The primary aim of this study was to investigate the impact of stretching and strengthening exercises combined with task-oriented training on hand dexterity in women diagnosed with Rheumatoid Arthritis (RA). The specific objectives were to evaluate the effects of stretching and strengthening exercises independently, as well as to assess the effectiveness of task-oriented training in improving hand dexterity.

In this study, we implemented a program combining task-oriented training for hand dexterity with stretching exercises for tight muscles and strengthening exercises for weak muscles. The goal was to enhance hand dexterity, strength, and the ability to perform activities of daily living in patients with Rheumatoid Arthritis (RA).

The study comprised 28 women diagnosed with Rheumatoid arthritis. Among them, 11 women were aged between 40 and 50 years, while 17 women were aged between 50 and 60 years. A higher incidence of affected hand dexterity was observed in women aged 50-60 years. These participants underwent assessment using the Visual Analog Scale (VAS) for pain evaluation and the Functional Dexterity Test (Peg board test) for assessing hand dexterity.

The physiotherapy treatment, including task-oriented training, was administered over a 12-week period. The study revealed that the pre-treatment Visual Analog Scale (VAS) scores were 6.4071 at rest and 5.4464 during activity, whereas the post-treatment VAS scores decreased to 2.182 at rest and 1.4035 during activity. These findings clearly indicate that after the treatment, pain levels decreased compared to before treatment.

In the Functional Dexterity Test (FDT), the average time taken to complete the pegboard test in seconds for both the left and right hand was assessed. Before treatment, the average time taken for the left hand was 45.42 seconds, and for the right hand, it was 41.03 seconds. After treatment, these times decreased to 33.46 seconds for the left hand and 29.75 seconds for the right hand, respectively. This indicates a significant improvement in the average time taken to complete the test after treatment.

Furthermore, the study demonstrated that stretching and strengthening exercises effectively enhanced hand muscle strength and alleviated pain in individuals with Rheumatoid Arthritis (RA). Additionally, incorporating task-oriented training into the treatment program improved the quality of life and ability to perform Activities of Daily Living (ADL) in RA patients with hand involvement. Importantly, hand exercises were found to have beneficial effects on improving strength without exacerbating disease activity.

It's interesting to note the study by Srikesavan[1] which investigated the impact of task-oriented training compared to conventional hand exercises in patients with Rheumatoid arthritis or osteoarthritis. In their study involving 30 Rheumatoid arthritis patients divided into two groups, both groups showed improvement in hand function outcomes after receiving treatment for 6 weeks. Remarkably, exercise compliance was high, exceeding 85%. Importantly, hand dexterity of the RA patients was notably enhanced.Drawing parallels, our study similarly demonstrates an improvement in hand dexterity by incorporating task-oriented training into the treatment plan for Rheumatoid arthritis patients. This underscores the potential efficacy of task-oriented training as an adjunct therapy in managing hand function in individuals with Rheumatoid arthritis[9].

Another study was done to find out the effect of Strengthening and stretching exercises for Rheumatoid Arthritis of the hand. Sarah[10], In this study 480 participants were taken with problematic Rheumatoid arthritis of hand for the period of 12 months. Result of the study shows Improvements in overall hand function. Improvement was seen in the exercise group than in the usual care group. Exercises improve the overall hand function and pain was also decreased.

The review by Bergstra *et al.*[6] highlighted the lack of consensus regarding the efficacy of different exercise regimens for Rheumatoid Arthritis (RA). However, they suggested that hand exercises could potentially improve strength without exacerbating disease activity. In their study, while pain alleviation was observed, there was no significant improvement in muscle strength, possibly due to the limited duration of the exercise program.

Similarly, in our study, we observed improvement in muscle strength without worsening disease activity, and pain levels were also reduced. This suggests that

our exercise program, which included stretching and strengthening exercises alongside task-oriented training, may offer benefits in terms of both pain management and muscle strength improvement in RA patients[7-11].

The study conducted by *Buljina et al.*[13] demonstrated notable improvements in pain reduction, tenderness, Range of Motion (ROM), Activities of Daily Living (ADLs), and hand strength following a three-week physiotherapy and exercise program. Similarly, our study also showed improvements in ADLs and a decrease in pain levels, aligning with their findings. However, unlike *Buljina et al.'s* study, we did not evaluate tenderness and ROM in our research. Despite this difference, the overall outcomes regarding pain reduction and improvements in ADLs were consistent between the two studies[14].

The primary objective of our treatment approach was to enhance the Activities of Daily Living (ADLs) in women with Rheumatoid Arthritis (RA) of the hand. The results suggest that integrating task-oriented training into the treatment regimen for RA patients may lead to improvements in ADL performance within a relatively short period of six weeks.

However, it's important to acknowledge certain limitations when interpreting the results of this study. Firstly, the absence of pre-treatment data made it challenging to compare the post-physiotherapy treatment results, as a baseline was not established. Additionally, the study was conducted at a single institution, potentially limiting the generalizability of the findings. Another limitation was the relatively small sample size, which could affect the precision of the results.

Furthermore, this study did not present long-term outcomes of task-oriented training. Long-term exercise programs pose challenges in terms of patient compliance, especially considering Rheumatoid arthritis is a progressive chronic condition. Future rehabilitation plans should consider incorporating resistance exercises. Additionally, the study group comprised exclusively female patients, and the lack of male patients and a control group are further limitations that should be addressed in future research endeavors.

4. Conclusion

This study shows that adding task- oriented programme to treatment plan of Rheumatoid arthritis of hand patients may improves hand dexterity and facilitate Activities of daily livings. Also stretching and strengthening exercises may be beneficial to improve strength, alleviate the pain and to improve quality of life.

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