

Marta Barłowska-Trybulec, Joanna Szklarczyk

Uniwersytet Jagielloński Collegium Medicum, Instytut Fizjoterapii, Zakład Fizjologii Medycznej

## Therapeutic exercises used in the rehabilitation of the rheumatoid hand

Ćwiczenia lecznicze stosowane w rehabilitacji ręki reumatoidalnej

### SUMMARY

**Introduction:** Rheumatoid arthritis (RA) is a chronic inflammatory disease leading in 70% of patients to deformation of the hand joints. Joint deformities reduce the manual dexterity of the hand and limit its gripping ability. One of the physiotherapeutic methods used in the rehabilitation of the rheumatoid hand is the use of therapeutic exercises.

**The aim** of the study was to present selected therapeutic exercises that can be used in the rehabilitation program for patients with RA.

**Summary:** Rehabilitation of the rheumatoid hand with the use of individual therapeutic exercises allows to maintain the manual dexterity of the hand, maintain its grasping ability and delay deformation changes occurring as a result of RA. It is recommended that the selection of exercises depends on the severity of the lesions, age and patients functional efficiency.

**Conclusions:** Therapeutic exercises are the recommended form of rheumatoid hand therapy due to its beneficial effect on muscle strength and the range of joint motion.

**Key words:** therapeutic exercises, rheumatoid arthritis (RA), rheumatoid hand

### STRESZCZENIE

**Wstęp:** Reumatoidalne zapalenie stawów (RZS) jest przewlekłą chorobą zapalną prowadzącą u 70% pacjentów do powstania deformacji o obrębie stawów rąk. Zniekształcenia stawów zmniejszają sprawność manualną ręki oraz ograniczają jej zdolność chwytaną. Jedną z metod fizjoterapeutycznych stosowanych w rehabilitacji ręki reumatoidalnej jest zastosowanie ćwiczeń leczniczych.

**Celem** pracy było przedstawienie wybranych ćwiczeń leczniczych możliwych do zastosowania w programie usprawniania pacjentów z RZS.

Address for correspondence / Adres do korespondencji: marta.barlowska@uj.edu.pl

ORCID: Marta Barłowska-Trybulec – 0000-0002-5756-0661, Joanna Szklarczyk: 0000-0002-3856-5635

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**Podsumowanie:** Rehabilitacja ręki reumatoidalnej z wykorzystaniem indywidualnych ćwiczeń leczniczych pozwala na utrzymanie sprawności manualnej ręki, zachowanie jej zdolności chwytnej oraz opóźnienie zmian deformacyjnych pojawiających się w przebiegu RZS. Zaleca się, aby dobór ćwiczeń był uzależniony od stopnia zaawansowania zmian chorobowych, wieku oraz od możliwości funkcjonalnych pacjentów.

**Wnioski:** Proponowane ćwiczenia lecznicze są zalecaną formą terapii ręki reumatoidalnej ze względu na korzystny wpływ na siłę mięśni oraz zakres ruchomości stawów.

**Słowa kluczowe:** ćwiczenia lecznicze, reumatoidalne zapalenie stawów (RZS), ręka reumatoidalna

## INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disease as a result of which pathological changes occur in the musculoskeletal system (Higgins, 2018). Approximately 70% of RA patients develop hand deformities (Minami, 2017) and damage to the ligamentous apparatus of the wrist, metacarpophalangeal joint, and proximal and distal interphalangeal joints (Henry, 2013). According to Steinbrocker's classification, there are subluxations in the wrist and metacarpophalangeal joints, finger ulnarization and deformities in the interphalangeal joints of the swan neck and boutonniere (O'Sullivan, 2016, Bullock, 2018). Functionally, increasing deformation of the hand joints leads to impaired grasping function of the upper limb and significantly reduce its manual dexterity (Williams, 2018). Disability makes the patient dependent on other people, stigmatize and evoke a sense of social separateness, leading to depression and mental disorders (Demmelmaier, 2018). Active hand exercises in the early stage of the disease are to prevent the development of deformities, muscle atrophy and limitations of the range of motion (ROM). In this period of the disease, exercises performed independently by patients at home are also of great importance (Hammond, 2016). In the later stage of the disease, rehabilitation is aimed at pain reduction, distortions and deformations that have already arisen, and adapting the patient to the activities of daily living (ADL). Hand exercises should be selected individually and adjusted to the location and degree of advancement of changes in individ-

ual joints (Bergstra, 2014). The rehabilitation program should include exercises shaping the three basic functions of the hand, which are the quality of the grip (paddle, pincer, cylindrical, hook and hammer grip), grip strength and manual skills (Williams, 2015).

According to research (Ellegaard, 2019), hand exercise programs for RA patients should include exercises to strengthen the muscles, increase the range of joint motion, and compensate for the motor deficits associated with performing daily activities (ADL). Currently the British National Institute of Health and Care (NICE) recommends a 12-week program to improve the rheumatoid hand using the Progressive Strengthening and Stretching for Rheumatoid Arthritis of the Hand (SARAH) program, which complements the basic therapeutic activities in RA. This program includes individual exercises with a therapist, home exercises and patient education in the protection of hand joints (Srikesavan, 2018). Studies also show the effectiveness of combining individual hand kinesiotherapy with the use of splints stabilizing the wrist joint in therapy restoring the functionality of the hand (Sadura-Sieklucka, 2018).

The aim of the study was to present examples of manual hand exercises that can be used in the rehabilitation process of patients with rheumatoid arthritis (RA). The proposed rheumatoid hand rehabilitation program may be helpful for physiotherapists in their daily clinical practice.

Rehabilitation of patients with RA is a multi-directional and comprehensive process. The selection of appropriate exercises and

therapeutic methods is essential in the early stages of the disease when changes in the locomotor system are not yet fixed. The aim of physiotherapeutic treatment in RA is:

- reduction of pain and inflammation;
- improvement of muscle strength;
- improvement of the range of joints motion;
- prevention of deformation and correction of already existing deformations;
- maintenance of the efficiency of the circulatory and respiratory system;
- formation of the correct compensation mechanisms that enable functioning in everyday life;
- maintenance of manual dexterity of the hand (Bullock 2018, Cooney, 2011).

Rehabilitation of the rheumatoid hand can be carried out based on passive, isometric, stretching, active unburdened and active exercises, as well as with the use of special equipment such as silicone balls, hedgehogs, spiked rollers, strength nets for resistance exercises or tables for hand manipulation exercises (Strike-savan, 2018). In the process of planning the rehabilitation program, it is necessary to take into account the movements of the dorsal and palmar flexion of the wrist, flexion and extension in the metacarpophalangeal and interphalangeal joints of the fingers, opposing the thumb and correct, corrected starting position for all exercises.

Before proceeding with therapeutic rehabilitation of the hand of a patient with RA, its age and current functional state, degree of hand deformity and the period of the disease should be taken into account. The rehabilitation program should also indicate the goals of therapy adequate to the patient's needs and exclude possible contraindications, e.g. threatening or existing tendon rupture, acute pain and inflammation (Minami, 2017).

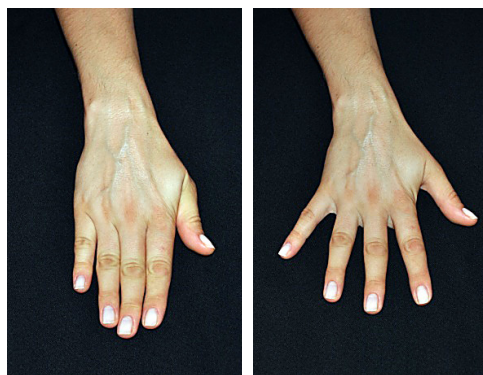
The exemplary rehabilitation program presents rheumatoid hand exercises for patients with RA in the period of disease remission. These exercises belong to the group of active exercises and active exercises with resistance. The purpose of these exercises is to improve muscle strength, increase the range of motion

of the joints of the hands, correct deformities and improve grip. Their advantage is the lack of the need for specialized rehabilitation equipment, which allows patients to perform training at home.

#### PROPOSED EXERCISE PROGRAM:

##### Exercise 1

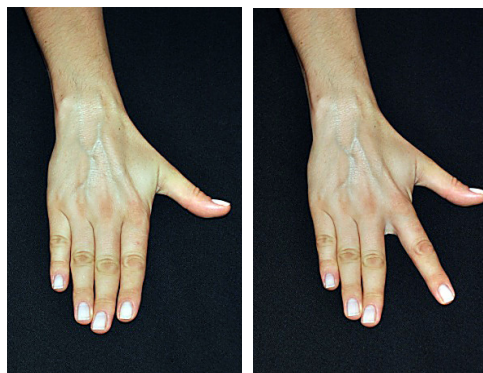
**Starting position:** forearm in pronation, resting on the table, fingers I–V adduction



**Movement:** active finger abduction in metacarpophalangeal joints (Fig. 1b) , return to starting position.

##### Exercise 2

**Starting position:** forearm in pronation, resting on the table, thumb abducted



**Movement:** adduction of II–V fingers to the thumb, return to starting position.

### Exercise 3

**Starting position:** forearm in pronation, resting on a table, I–V fingers abducted at the metacarpophalangeal joints.



**Movement:** bending the fingers one by one from the I–V at the interphalangeal joints without lifting the metacarpus from the ground, return to starting position.

### Exercise 4

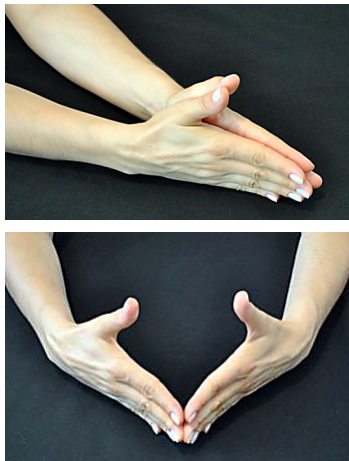
**Starting position:** in the intermediate position, the forearm rests on the ground with the hypothenar of the little finger



**Movement:** opposing the second–fifth fingers to the thumb in turn, return to starting position

### Exercise 5

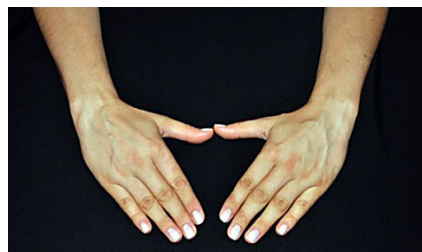
**Starting position:** forearms in the intermediate position resting with the hypothenar of the ground, hands joined with the fingertips II–V



**Movement:** moving the wrists apart, without removing the fingertips, return to starting position

### Exercise 6

**Starting position:** forearms in pronation, resting on the table in the axial alignment of the joints



**Movement:** radial adduction in the wrist joint, return to starting position

### Exercise 7

**Starting position:** forearm in supination or in an intermediate position, catching the ball



**Movement:** squeezing the ball with one hand alternately



or with both hands simultaneously,



return to starting position

### Exercise 8

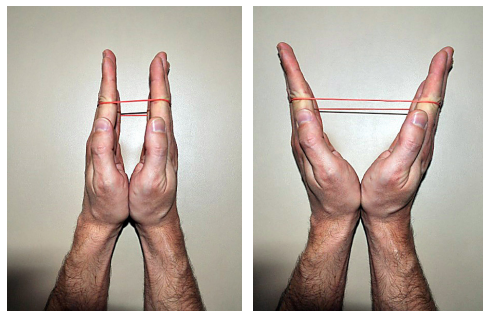
**Starting position:** forearm in pronation, adducted fingers covered by a rubber band



**Movement:** fingers abduction in the metacarpophalangeal joints with stretching the rubber band return to starting position

### Exercise 9

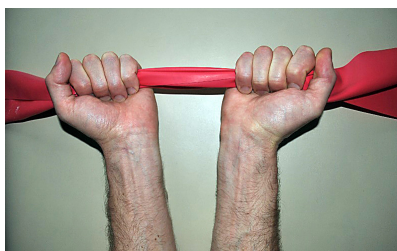
**Pozycja wyjściowa:** przedramiona w pozycji pośredniej, oparte o stół kłębikiem, palce II-V objęte gumką



**Movement:** dorsiflexion of the wrist with elastic resistance, return to starting position

## Exercise 10

**Starting position:** forearms in supination, grasping the tape with both hands



**Movement:** Tape stretching with radial abduction, return to starting position

The above exercises can be performed every day or every other day. Each for 20-30 repetitions, depending on the strength of the muscles and the individual capabilities of the patient. During the period of exacerbation of symptoms, it is not recommended to exercise in inflamed joints. Exercise shouldn't hurt. Before starting the exercises, it is recommended to perform a therapeutic massage of the hands or physical treatments (local cryotherapy, laser therapy, interference currents, diadynamic currents, Sollux) that relieve pain and allow the preparation of tissues for therapy (Nelson, 2017; Bullock, 2018; Adly, 2017).

## SUMMARY

Rehabilitation of the rheumatoid hand is an important point in the rehabilitation program for patients with RA. The effectiveness of the therapy depends to a large extent on the patient's involvement in the rehabilitation process, his individual needs and the therapeutic methods used (Minami, 2017). The selection of therapeutic exercises should depend on the degree of hand deformation, the period of the disease and the patient's functional efficiency. The latest clinical guidelines recommend the use of rheumatoid hand therapy aimed at improving the range of joint mobility, increasing muscle strength, developing correct compensation mechanisms and protecting joints against

further deformities (ACR, 2020). The results of current research indicate the effectiveness of hand exercises in relation to general manual dexterity, grip strength and prevention of deformities in the course of RA (Lamb, 2015). These reports are also confirmed by other research results showing that in patients suffering from RA <5 years, the use of hand exercises in conjunction with joint protection and education allows the hand to remain functional for a longer period of time (Hammond, 2016). However, studies by Lamb et al. indicate low effectiveness of hand kinesiotherapy on subjective pain sensation in the long run (Lamb, 2015). The low effectiveness of exercises in terms of pain reduction may imply the need to use other methods of pain relief, including pharmacotherapy or physical therapy (Cooney, 2011).

Individual rehabilitation of the rheumatoid hand combined with home exercises and education is an accepted form of therapy for patients with RA. On the basis of previous knowledge and conducted research it was noticed that, rheumatoid hand therapy improves the range of motion (ROM) and the grip strength of the hand, but in the long perspective it does not give a permanent analgesic effect.

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