

## Effect of occupational therapy intervention in a comprehensive rehabilitation program on patients with early rheumatoid arthritis

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### Abstract:

Rheumatoid arthritis (RA) is considered to be a general disease of the body at the present stage of medical science development. It is based on systemic progressive disorganization of connective tissue with significant local and general autoimmune changes; there is an inflammatory destructive lesion of the joints, which causes a functional failure and leads to ankylosing spondylitis. Unsatisfactory long-term results of the RA treatment draw attention of researchers to the early stage of rheumatoid arthritis, when the reversibility of morphological changes in tissues is higher, the autoimmune process is fully formed, and there are no severe joint dysfunctions. At the same time, in approximately 70% of cases the erosive destructive changes in joints appear within the first 3-6 months of disease onset, which determines the unfavorable prognosis of early RA. Systematic occupational therapy is important for the success of rehabilitation. A number of scientific studies, as well as international/national guidelines for the management of patients with RA have noted that occupational therapy is an effective method aimed at maintaining the function, especially of the wrist joints. It is recommended to intervene in the early stages of the disease, as the occupational therapy in the rehabilitation of such patients in the long run increases the likelihood of maintaining their independence in everyday life by increasing muscle strength, reducing pain, and increasing tolerance to physical exercises. The aim of the study is to develop and evaluate the efficiency of occupational therapy intervention in a comprehensive rehabilitation program for patients with early rheumatoid arthritis. During the clinical studies which lasted 3 months the participants were divided into 2 groups by random sampling: the main group and the control one. The main group consisted of 18 people, the control - of 17 people. Before the occupational therapy intervention the main and control groups did not differ statistically in terms of the degree of vital activity, the severity of pain in the wrist joints, indicators of locomotor function of wrists (compression force) and the time of morning stiffness of the joints. After occupational therapy intervention, the studied indicators showed a positive trend in the main group compared with the control one ( $p < 0,05$ ). Therefore, the data obtained during the study confirmed the efficiency of occupational therapy intervention in a comprehensive rehabilitation program for patients with early rheumatoid arthritis.

**Key words: occupational therapy intervention, comprehensive rehabilitation program for patients, early rheumatoid arthritis**

### Introduction

Rehabilitation of patients with rheumatoid arthritis (RA) remains one of the most difficult general medical and social problems of modern society. The urgency of the problem is due to the severity of musculoskeletal disorders, early decline in functional capacity of the patient, rapid loss of professional and social skills, difficulties in physical and psychological adaptation of patients to motor disorders (Dido et al., 2021; Grygus et al., 2020, 2021; Karpukhina et al., 2020; Nasonov, 2010; Nesterchuk et al., 2019, 2020; Nogas et al., 2019; Shestopal et al., 2021).

In terms of the severity of joint damage, RA has no equal among other diseases of the musculoskeletal system. It should be noted that women suffer 4 times more often than men; mainly people of working age are affected. In 75% of cases, RA begins with metacarpophalangeal and proximal interphalangeal joints damage (Fam, 1993). Simultaneous damage of symmetrical joints on both sides are observed in half of patients, thereafter this percentage increases. Due to the inflammatory process in the joints, the limb acquires a forced (often semi-bent) position, in which pain is less severe. In the knee joint, for example, if there is an exudate that stretches the capsule and ligaments of the joint, when muscle strength decreases, instability occurs (Mojs, 2011).

Recent studies have shown that the first years (and even months) after onset of RA are crucial in terms of the progression of the pathological process and the prediction of its long-term consequences (Bortkevich et al., 2021).

al., 2009). Thus, (Emery et al., 2003) substantiated and proved the importance of differentiation of several stages of RA according to the time period:

- Very early is pathological process in the first 12 weeks of onset;
- Early established RA is diagnosed in patients with symptoms lasting up to 12 weeks;
- Established stable RA is a pathological process that lasts more than 12 months;
- Resistant RA is diagnosed when there is no reduction of inflammation or clinical symptoms after treatment with basic drugs (Ponik, 2019).

Disability begins at an early stage of the disease and becomes a lifelong problem in 27% of RA patients within the first three years after the onset of the disease and after 8-11 years occurs in approximately 85% of patients that need continuous medical treatment, rehabilitation, often complex orthopedic surgery. With increasing duration of the disease, the progressive course leads to the involvement in the pathological process of new joints and extra-articular structures, the formation of persistent irreversible deformations (destruction, subluxations, contractures of the joints). All this leads to severe functional insufficiency, disorders in all spheres of life and a significant reduction in the quality of life of patients. Provided that the question of early initiation of treatment and rehabilitation of patients with RA remains open (Karateev D.E., 2006).

A number of scientific studies (Hammond, 2004), as well as international/national guidelines for the management of patients with RA have noted that occupational therapy is an effective method aimed at maintaining the function, especially of the wrist joints. Occupational therapy is a method of rehabilitation aimed at restoring, maintaining and developing individual skills necessary for daily activities, work, leisure and recreation of people who have lost the ability to take care of themselves, work and go about their usual duties. Systematic occupational therapy is important for the success of rehabilitation. It is recommended to intervene in the early stages of the disease, as the occupational therapy in the rehabilitation of such patients in the long run increases the likelihood of maintaining their independence in everyday life by increasing muscle strength, reducing pain, and increasing tolerance to physical exercises. In addition, regular exercising affects the emotional sphere of life through psychological adaptation to life with arthritis. (Mathieux et al., 2008) studied the effect of early occupational therapy on wrist function compared to normal activity in 60 patients with RA with disease duration less than 2 years (Macedo, 2008). After 3 months in the group of patients who worked with an occupational therapist, there was a significant improvement in the force of compression of the wrists and the functional HAQ index.

Thus, in contrast to other methods of rehabilitation, aimed primarily at restoring functionality, occupational therapy helps patients in their adaptation to everyday life achieving the maximum independence and autonomy. Nevertheless, a number of studies indicate a shortage and lack of a clear system for the use of this method in everyday clinical practice in patients with RA. The analysis of scientific sources showed that the problem of physical rehabilitation of patients with rheumatoid arthritis is insufficiently studied and is relevant and appropriate for research. The program of physical rehabilitation of patients with rheumatoid arthritis should be comprehensive and should include methods of physical therapy such as: physical therapy, position treatment, hydrokinesiotherapy, massage, physiotherapy and occupational therapy. This set of methods of physical rehabilitation accelerates the recovery and treatment of patients and facilitates their faster and smoother return to normal life, with minimal restrictions or no restrictions.

The aim of the study is to study the efficiency of occupational therapy intervention in a comprehensive rehabilitation program for patients with early rheumatoid arthritis.

### **Material & methods**

**Participants.** In accordance with the aim of the study, which took place in 2016-2018 on the basis of the rehabilitation department of Zaporizhzhia Regional Clinical Hospital, we observed 35 patients (women) aged 45-65 years with a diagnosis of RA established up to 12 weeks after onset of the disease. Criteria to enroll patients in the study were: diagnosis of RA which meets the criteria of the European Antirheumatic League/American College of Rheumatologists (EULAR/ACR) 2010, the activity of stage I of RA (DAS28 2,6-3,2), functional class II and the absence of severe concomitant pathology. Patients were enrolled in the rehabilitation program based on standardized selection criteria: 1) a document of consent to participate in the study, approved by the Ethics Committee, signed by the study participants; 2) the ability and desire of study participants to comply with all protocol requirements throughout the implementation period of the rehabilitation program.

**Goals, methods and procedures.** During the clinical studies the participants were divided into 2 groups by random sampling: the main group and the control one. The main group consisted of 18 people, the control - of 17 people. Before the occupational therapy intervention the main and control groups did not differ statistically in terms of the degree of vital activity, the severity of pain in the wrist joints, indicators of locomotor function of wrists (compression force) and the time of morning stiffness of the joints.

The ability to perform actions in everyday life was determined using the Health Assessment Questionnaire (HAQ) which includes 20 questions related to the patient's activity in everyday life, grouped into 8 scales of 2-3 questions in each scale. HAQ is the arithmetic mean of the sum of the maximum answers on each scale taking into account additional questions. The questionnaire also includes a 100 mm visual analogue scale

of pain (VAS) which the patient evaluates in the past week. HAQ is completed by patients in 2-3 minutes; the calculation takes no more than 1 minute. The compression force of the wrists was measured with a dynamometer in kilopascals. The patient produced three compressions; the average value was calculated for each hand separately.

Rehabilitation program. During the study patients of both groups apart from the drug therapy received a set of rehabilitation measures, which included therapeutic massage, physiotherapy, kinesitherapy (Lynberg, 1994). In the main group, an occupational therapy intervention was additionally conducted in the form of training of motor skills, methods of forming the correct functional and behavioral stereotypes in the radial wrist joint, needed for everyday life and professional activity (Orlova, 2013):

- position treatment: preservation (restoration) of the axis of the limb - the rule is "to keep the wrist edgewise" or palm down (without deflection of the wrist towards the little finger); preservation of the transverse and longitudinal arch of the wrist; correct position of the wrist at rest (wrist on a tennis ball, cylindrical surface); direct or neutral position of the wrist when performing household activities;
- training on how to protect the joints: avoid leaning on the fist or fingers shifting the weight of the whole body; avoid intense grasping of objects with pressure on the small joints of the wrist, grasping objects with the thumb and fingertips (grip "tweezers"); use, if possible, "large joints" to reduce the load on small; avoid positions that increase the pressure on deformed joints: most of the joints in the upright position are stable - bending the wrist when lifting heavy objects contributes to the deformation of damaged joints, the use of torque during activity (wringing out the laundry, opening cans) increases the pressure on articular ligaments;
- to prevent the formation of deformations of the "swan neck" type, it is recommended to reduce the load on the end phalanges by using household adaptive equipment and technical devices that facilitate self-care (items with thick, non-slip handles, sharp cutting surfaces, special household appliances). The use of objects with thick handles provides a more stable position in the hand, bending the middle joints of the fingers when gripping and working without tension. The handles of the boxes should be opened with the whole hand.

The occupational therapy intervention program also included:

- a set of special exercises to restore fine motor skills, strength and fine coordination of the wrists, the amount of movements in the finger joints, their skin and joint sensitivity (including objects);
- performing a set of exercises to maintain joint mobility in the maximum amplitude.

If there is pathological positioning of joints, position treatment using weights is applied as well. According to the method (Scholten, 2009), the joint is brought to the "extreme" position in the direction of restriction of movement and the loading is fixed on it, the vector of gravity of which coincides with the vector on which movement is limited. Time of training depending on the age and condition of the patient is from 10 to 30 minutes 3-5 times a day. When performing this manipulation there is a gradual slow passive stretching of the periarticular musculoskeletal system, which leads to improved motor function of the joint. It should be noted that occupational therapy has almost no contraindications, except for a period of high RA activity, accompanied by severe pain, and other systemic manifestations of the process. In this situation, in order to prevent the early formation of contractures, passive gymnastics is recommended, the amount of movement in the joints is determined within a painless corridor (Grygus, 2014).

Statistical analysis. Statistical processing of the obtained results was performed on the basis of the software package Statistica 6.0. The Mann-Whitney-Wilcoxon criteria were used to assess the significance of intergroup diversity. Diversity has always been considered statistically significant with  $p < 0.05$ .

## Results

During the initial clinical study, we determined that the indicators of impairment in vital function using health questionnaire and functional indicators of impairment (Health Assessment Questionnaire - HAQ), the severity of pain on a visual analogue scale (VAS), indicators of locomotor function of the wrist and the term of the morning stiffness of the joint in the main and control groups on all indicators did not differ statistically from each other. Indicators of the functional condition of patients with rheumatoid arthritis are given in the table.

Table - Indicators of the functional condition of patients with early rheumatoid arthritis, ( $X \pm m$ )

Indicators	MG (n=18)		CG (n=17)	
	at the beginning	at the end	at the beginning	at the end
HAQ, Health Assessment Questionnaire	1,38±0,14	0,51±0,04**	1,33±0,09	0,87±0,08*
VAS, mm	67,52±3,73	25,18±3,28**	62,97±3,24	40,46±2,81*
Compression force of more affected limb, kPa	52,75±14,31	70,85±9,18**	54,02±12,46	61,15±14,11*
Compression force of less affected limb, kPa	62,68±15,75	82,23±18,42**	60,31±10,04	73,49±15,58
Time of morning stiffness of the wrist joints, hours	3,4±0,5	1,9 ±0,2**	3,1±0,6	2,3±0,3**

Note: differences compared with the beginning of the study \* ( $p < 0,05$ ), \*\* ( $p < 0,005$ )

As can be seen from the table in patients with rheumatoid arthritis there were moderate impairment in life function. The HAQ index averaged  $1.38 \pm 0.14$  in the main group and  $1.33 \pm 0.09$  in the control one. Activities such as housework, walking, getting up, and ensuring hygiene suffered the most. Half of RA patients used various devices or help from other people. The pain syndrome, measured by VAS, in the main group corresponded to  $67.52 \pm 3.73$ mm and to  $62.97 \pm 3.24$ mm in the control group. The compression force of the more affected limb in the main group did not differ significantly from the control and was  $52.75 \pm 14.31$  and  $54.02 \pm 12.46$ , respectively. Morning stiffness in the joints of the upper limb also did not differ statistically in the main and control groups and was  $3.4 \pm 0.5$  and  $3.1 \pm 0.6$ , respectively.

According to the results of a control study conducted at the end of the rehabilitation measures, the functional capabilities of patients improved. The HAQ index decreased from  $1.38 \pm 0.14$  to  $0.51 \pm 0.04$  in the main group ( $p < 0.005$ ) and from  $1.33 \pm 0.09$  to  $0.87 \pm 0.08$  in the control group (0.05). After the occupational therapy intervention, the scales of getting up and working at home suffered slightly, but no assistance was needed. The severity pain according to VAS in the main group decreased significantly from  $67.52 \pm 3.73$  to  $25.18 \pm 3.28$  ( $p < 0.005$ ) and from  $62.97 \pm 3.24$  to  $40.46 \pm 2.81$  ( $p < 0.05$ ) in the control group.

After the completion of the rehabilitation program, there was a significant positive dynamics of locomotor function of the musculoskeletal system. Thus, in the main group, the compression force of the more affected limb improved from  $52.75 \pm 14.31$  to  $70.85 \pm 9.18$ kPa ( $p < 0.005$ ) and less affected limb from  $62.68 \pm 15.75$  to  $82.23 \pm 18.42$  ( $p < 0.005$ ). In the control group, the compression force of the more affected limb improved from  $54.02 \pm 12.46$  to  $61.15 \pm 14.11$ kPa ( $p < 0.05$ ), and less affected limb from  $60.31 \pm 10.04$  to  $73.49 \pm 15.58$ kPa ( $p < 0.05$ ). Morning joint stiffness decreased from  $3.4 \pm 0.5$  to  $1.9 \pm 0.2$  ( $p < 0.005$ ) in the main group and from  $3.1 \pm 0.6$  to  $2.3 \pm 0.3$  ( $p < 0.005$ ) in the control group.

Thus, after the comprehensive rehabilitation program, the studied factors in the main group show positive dynamics and remain significantly higher than the factors of the control group. Thus, in the main group, the functional index (according to the HAQ questionnaire) decreased by 63%, compared with the control group - 35%, the pain index according to VAS decreased by 63%, in the control group - by 36%, the compression force of the more affected limb increased by 34%, in the control group - by 13%. The compression force of the wrist of the less affected limb in the main group increased by 62%, in the control group - by 22%. The duration of morning stiffness in the main group decreased by 44%, compared with the control group - 25%.

The inclusion of an occupational therapy intervention program in the treatment complex contributed to a more significant expansion of physical activity, improvement of daily activities related to the patient's ability to perform work around the house and outside.

## Discussion

Rheumatoid arthritis (RA) is considered to be a general disease of the body at the present stage of medical science development. It is based on systemic progressive disorganization of connective tissue with significant local and general autoimmune changes; there is an inflammatory destructive lesion of the joints, which causes a functional failure and leads to ankylosing spondylitis.

In terms of the severity of joint damage, RA has no equal among other diseases of the musculoskeletal system. It should be noted that women suffer 4 times more often than men; mainly people of working age are affected. In 75% of cases, RA begins with metacarpophalangeal and proximal interphalangeal joints damage. Simultaneous damage of symmetrical joints on both sides are observed in half of patients, thereafter this percentage increases. Due to the inflammatory process in the joints, the limb acquires a forced (often semi-bent) position, in which pain is less severe. In the knee joint, for example, if there is an exudate that stretches the capsule and ligaments of the joint, when muscle strength decreases, instability occurs.

Rehabilitation measures are an integral part of the rehabilitation treatment of RA patients. They allow a certain way to control the course of the disease and are a necessary adjunct to pharmacological therapy. The main objectives of rehabilitation in RA are to reduce pain, preserve the functionality of the affected joints, the ability to self-care, household activities, professional work, stabilization of the pathological process and improving the quality of life. In a clinical study (Hammond, 2010) it was proved that the best results in the management of patients with RA provides a multidisciplinary approach (Niedermann, 2010) with the involvement of a rheumatologist, physical therapist, orthopedist, psychologist, nutritionist, occupational therapist. The rehabilitation program may include group and individual therapeutic exercises, the use of preformed physical factors, orthotics, educational programs for patients, and psychological correction. Rehabilitation measures should be started as early as possible and carried out at all stages of rehabilitation.

(De Buck et al., 2010) assessed the impact of a multidisciplinary rehabilitation program on maintaining the ability to work on the risk of job loss in 140 patients with rheumatic diseases in the Netherlands (Niedermann, 2010). 74 patients participated in the occupational rehabilitation program, 66 - received regular outpatient treatment. There was no difference between two groups in terms of job loss (total incapacity for work or unemployment). 24% of patients in the main group and 23% of the control one lost their jobs after 24 months. R. Mathieux et al. studied the effect of early occupational therapy on wrist function compared with normal activity in 60 patients with RA with a disease that lasts less than 2 years (McDonald, 2012). An important

component of complex therapy of patients with RA is occupational therapy (Stultjens, 2004; Feldman, 2010; Hand, 2011). After 3 months in the group of patients who took occupational therapy, there was a significant improvement in the compression force of the wrist and the HAQ index. In our study, we found that in both the main and control groups there was a statistically significant ( $p < 0.05$ ) improvement.

The above results of the study show that occupational therapy is important in the treatment of RA as it plays the role of training motor function, learning motor skills, performing daily exercise with less pain, joint protection, use of helpers and splints. Using a splint improved the force of compression of the wrists, reduced joint pain, but limited range of motion. Occupational therapy with training, practicing and recommendations for joint protection helps patients better tolerate daily household loads, dress, cook, do the cleaning with less pain.

### Conclusions

It should be noted that, despite all the success of modern medical treatment of early arthritis, physical rehabilitation methods occupy an important place in a comprehensive program of patient management. The rehabilitation plan accelerates the recovery and treatment of patients and they return to normal life sooner, with minimal or no restrictions. In our study we demonstrated that the use of a comprehensive rehabilitation program with an occupational therapy intervention program has a positive effect on the functional HAQ index, there is a decrease in pain in the joints of the upper limb, the compression force of the affected limb increases, the duration of morning stiffness decreases significantly. Thus, the use of a comprehensive rehabilitation program helps to improve the functional condition, working ability, helps to better tolerate daily household stress, which has a positive effect on professional, social adaptation of the patient with early rheumatoid arthritis.

**Conflict of interest.** The authors declare that there is no conflict of interest regarding the research, authorship and publication of this article.

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