

## The effect of physical therapy on the improvement of the quality of life in rheumatoid arthritis patients

### Îmbunătățirea calității vieții pacienților cu artrită reumatoidă prin fizioterapie

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#### Abstract

**Background.** Rheumatoid arthritis is a chronic multisystem autoimmune disease with unknown etiology, progressive evolution, and increased incidence in the adult population (0.5-1% of the world's population); it can lead to severe deterioration of the patients' functional abilities.

Physical therapy is a non-pharmacological treatment method aimed to reduce inflammation and pain in rheumatic diseases.

**Aim.** To evaluate the effects of physical therapy on the improvement of the patients' health-related quality of life.

**Methods.** An interventional, longitudinal, prospective study was designed, which included 100 patients (50 patients with rheumatoid arthritis and 50 patients with osteoarthritis) from the Rheumatology Clinic, Emergency County Hospital – Cluj-Napoca. The patients had a first course of physiotherapy at the baseline of the study, which was repeated after 6 months. Evaluation was performed by completing the Health Assessment Questionnaire (HAQ) and the Visual Analogue Scale of Pain (VAS).

**Results.** Statistically significant differences in HAQ scores were identified when comparing baseline data and re-evaluation data after 6 months (the Friedman ANOVA test,  $p < 0.005$ ). The interpretation of VAS showed a decreased pain perception at the end of treatment compared to the beginning of treatment.

**Conclusions.** Significant positive short-term results were found regarding the patients' quality of life, pain relief, joint mobility and functional status. There is a need for future studies in order to obtain standardized rehabilitation programs.

**Keywords:** quality of life, rheumatoid arthritis, rehabilitation, physical therapy.

#### Rezumat

**Premize.** Artrita reumatoidă este o boală cronică autoimună multisistemică de etiologie necunoscută, cu caracter progresiv, cu o incidență mare (0,5-1% din populația lumii) la persoanele adulte, care poate duce la deteriorarea severă a abilităților funcționale ale pacienților.

Fizioterapia este o metodă de tratament non-farmacologică, utilizată în tratarea bolilor reumatice, având efecte antiinflamatorii și antialgice.

**Obiective.** Evaluarea efectului fizioterapiei din punct de vedere al creșterii calității vieții, la pacienții cu artrită reumatoidă.

**Metode.** A fost realizat un studiu intervențional longitudinal prospectiv, care a inclus 100 de pacienți ai Clinicii Reumatologice, Spitalul Clinic Județean de Urgență – Cluj-Napoca, 50 de pacienți cu artrită reumatoidă și 50 de pacienți cu artroză. Pacienții au efectuat o primă cură de fizioterapie la începutul includerii în studiu și au repetat cura la 6 luni. Evaluarea pacienților s-a efectuat prin completarea chestionarelor Health Assessment Questionnaire (HAQ) și a Scalei Analog Vizuale a durerii (VAS).

**Rezultate.** S-au identificat diferențe semnificative statistice în ceea ce privește scorurile HAQ la compararea datelor inițiale cu cele din a doua cură (Testul Friedman ANOVA,  $p < 0,005$ ). Interpretarea scalei analog vizuale a durerii a arătat scăderea percepției pacienților asupra durerii resimțite la finalizarea tratamentului, în comparație cu începutul tratamentului.

**Concluzii.** S-au remarcat rezultate pozitive pe termen scurt privind creșterea calității vieții pacienților, scăderea durerii, creșterea mobilității articulare, îmbunătățirea statusului funcțional. Se impune necesitatea de viitoare studii în vederea obținerii de programe de reabilitare ce pot fi standardizate.

**Cuvinte cheie:** calitatea vieții, artrită reumatoidă, recuperare, fiziokinetoterapie.

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## Introduction

*The quality of life* is a multidimensional concept that includes all aspects of the patient's life, physical, functional, emotional, social and spiritual. It shows an individual's self-perception of their expectations, standards and concerns in the context of the culture and value system in which they live (\*\*\*, 1995). Physical, mental, social well-being, the capacity to fulfill daily tasks/independence, interpersonal relationships, self-assertion and social integration are the parameters that define the quality of life (Carr et al., 2005).

Inflammatory rheumatic diseases are chronic, progressive and disabling disorders that have a negative effect on the patients' quality of life, leading to important functional, socio-professional, cultural limitations. Regarding the improvement of the patients' quality of life, the following objectives are evidenced, which require finding solutions: personal finances, being an active person involved in society, socialization, health; cultural perspectives should also be given importance (Liedberg et al., 2012). At international level, there is an increasing interest in chronic diseases and the economic problems they cause for both the disabled individual and the entire society (Calfova et al., 2011). There is a need to find specific, effective solutions and methods in order to reduce these limitations and allow patients to live the best possible life.

*Rheumatoid arthritis* (RA) is a chronic multisystem autoimmune inflammatory disease, with progressive evolution, unknown etiology, and a high incidence in the adult population. It is characterized by an arthropathy with deforming and destructive evolution, as well as with multiple systemic manifestations that may lead to severe deterioration of the patients' functional abilities (Ferreira et al., 2008). The disease onset occurs at a young age, usually between 30-50 years, but the disease can develop at any age, predominantly affecting women. It affects about 0.5-1% of the world's population.

Non-surgical drug therapy includes the application of hot and cold procedures, splints and orthoses, therapeutic exercises, occupational therapy, assistive equipment, education for the protection of the affected joints, education for energy conservation (1).

*Osteoarthritis or arthrosis* (OA) belongs to the group of degenerative rheumatic diseases and is characterized by a deterioration of the joint cartilage, accompanied by an increase of subchondral bone activity. It is the most frequent rheumatic disease; its incidence increases with age, with a peak between 55 and 75 years. About 10% of the population aged over 60 years is affected by osteoarthritis, with a predominance of women (2/1). The etiology of osteoarthritis is unknown; age, genetic predisposition, mechanical stress, inflammatory joint disease are taken into consideration.

The physical therapy of osteoarthritis is aimed at reducing pain, improving mobility in the affected joints and stopping the disease evolution by diminishing joint strain (prophylaxis through activities of daily living - ADLs, weight loss in overweight patients, possibly a change of the workplace). Physical therapy involves kinesiotherapy for the restoration of joint mobility and the prevention of

muscle atrophy due to inactivity, as well as electrotherapy and thermotherapy for the reduction of inflammation, periarticular muscle contracture, and pain (Popescu & Ionescu, 2002).

## Objectives

This study aimed to assess the effect of physiokinesiotherapy on the quality of life of patients with rheumatoid arthritis and osteoarthritis. Another objective of the study was to evaluate rehabilitation treatment by adding electrotherapy in the case of some patients, and to compare changes in the values of the Health Assessment Questionnaire (HAQ) and the Visual Analogue Scale of Pain (VAS).

## Material and methods

### *Research protocol*

#### *a) Period and place of the research*

The study was approved by the Ethics Commission of the "Iuliu Hațieganu" University of Medicine and Pharmacy Cluj-Napoca (Approval no. 540/13.12.2012).

The study was carried out at the Rheumatology Clinic of the Emergency County Hospital Cluj, in the Rehabilitation Therapy Laboratory (the physical therapy facility). This was a prospective longitudinal experimental study, spanning a period of 2 years, between September 2013 and September 2015.

#### *b) Subjects and groups*

The study group included 100 patients, of which 50 patients with rheumatoid arthritis and 50 patients with osteoarthritis. The inclusion criteria were positive diagnosis, the indication of a physical therapy rehabilitation program, and patient compliance. The exclusion criteria were non-compliance to treatment, chronic decompensated disease, mental disorders, neoplasia. An exclusion criterion for the performance of electrotherapy was the presence of inflammatory syndrome. All the subjects included in the study signed an informed consent form.

#### *c) Tests applied*

The study protocol included functional evaluation and rehabilitation treatment.

Functional evaluation was performed using the Health Assessment Questionnaire (HAQ) and the Visual Analogue Scale of Pain (VAS).

The treatment plan was elaborated in 2 stages: initial rehabilitation treatment including 10 sessions, then re-evaluation and 10 rehabilitation treatment sessions after 6 months.

In the first stage, the patients were evaluated based on the Health Assessment Questionnaire and the Visual Analogue Scale of Pain at the beginning and at the end of the treatment course. In the second stage, HAQ was evaluated during treatment and VAS was assessed at the beginning and at the end of the period.

The rehabilitation treatment was developed according to the American College of Rheumatology/The European League Against Rheumatism (ACR/EULAR) criteria: current clinical manifestations of the disease; the patients' symptoms and prognostic factors (disease activity/inflammation, pain, level of functionality/disability);

individual factors (sex, age), comorbidities, concomitant medication; the patients' wishes and expectations.

The treatment plan included electrotherapy and kinesiotherapy.

Electrotherapy consisted of the application of electrotherapeutic procedures (ionization and ultrasound) to the affected regions, with an analgesic, anti-inflammatory and decontracting indication.

Electrotherapeutic procedures were performed in treatment rooms intended for these procedures, under optimal physical and mental comfort conditions for the patient.

The physical therapy equipment used was that of the Treatment Facility of the Rheumatology Clinic.

All patients underwent kinesiotherapy, but only some of them also benefited from electrotherapeutic procedures, which were the differentiating factor. The procedures were prescribed based on the therapeutic indications required by the disease status at that time (presence of inflammatory syndrome, which represented an exclusion criterion for electrotherapy).

*Kinesiotherapy* consisted of physical exercise programs specific for each individual disorder. The following were used: posturing, passive, passive-active and active exercises, isometric and isotonic exercises for the restoration of joint mobility, the restoration of muscle force and the reduction of pain, relaxation exercises, breathing exercises, taking into consideration the patients' symptoms and needs. An individual physical exercise program was developed for each patient depending on diagnosis and the objectives to be attained; this program could be adjusted every day if necessary, depending on the patient's functional status.

*HAQ* allows an evaluation of the patient's daily activities and subjective well-being. It investigates the ability to perform 20 daily activities, each with 4 categories of possible answers (without difficulty – score 0, with some difficulty – score 1, with high difficulty – score 2, impossibility to perform – score 3). The 20 activities are classified into 8 categories with 2-3 subitems. Calculation is performed based on the highest score for each activity of each subcategory. Patients are also asked about the use of assistive equipment or whether they need the assistance of people around them (Uhlir et al., 2006).

*VAS* provides information about the patient's perception of pain at a given moment. The patient is asked to score the pain felt on an analogue scale from 1 to 10.

#### d) Statistical processing

Quantitative variables were summarized as mean  $\pm$  standard deviation for normally distributed data, and as median and the interval between the first quartile (the 25th percentile) and the third quartile (the 75th percentile) in the contrary case. Qualitative variables were summarized as absolute or relative frequencies and were graphically represented as pie charts or columns.

Comparisons between normally distributed quantitative variables in the three studied groups were made via the ANOVA test, and the Friedman ANOVA test was used for quantitative variables without a normal distribution. Paired samples were compared by applying the Sign test at a significance threshold of 1.7%. Quantitative variables

without a normal distribution of two independent samples were compared via the Mann-Whitney test. The comparison between two percentages was performed by applying the Z test, using the online application (2).

Statistical analysis was performed with the Statistica (StatSoft. v. 8) program and for graphic representations, Microsoft Excel was used. The level of significance applied when comparing the two groups was 0.05.

## Results

The percentage of patients with RA who underwent electrotherapeutic procedures varied between 34% (17 patients on re-evaluation) and 44% (22 patients in the initial stage) (Fig. 1).

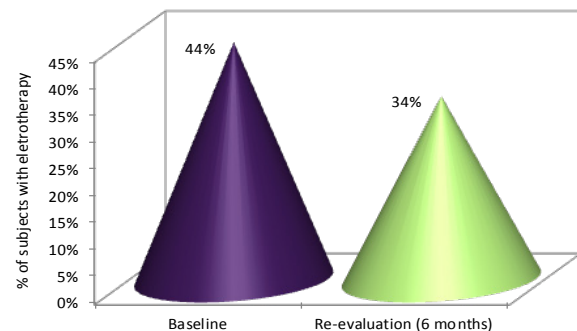


Fig. 1 – Percentage of patients with rheumatoid arthritis who underwent electrotherapeutic procedures.

The majority of osteoarthritis patients underwent electrotherapeutic procedures (50 patients during the initial stage, 46 on re-evaluation) (Fig. 2).

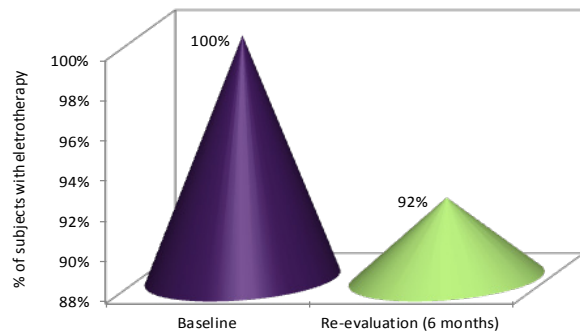
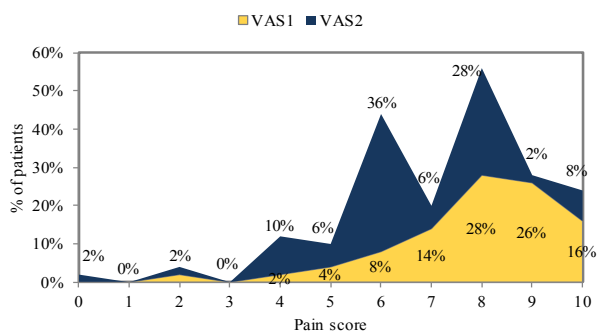


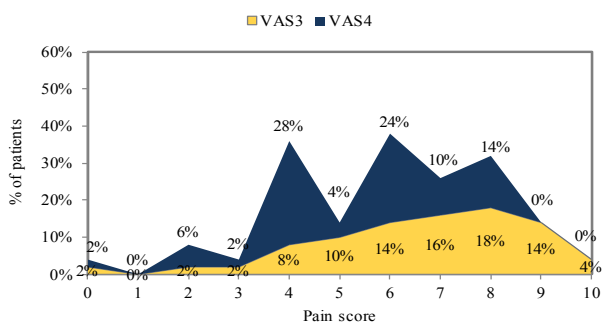
Fig. 2 – Percentage of patients with osteoarthritis who underwent electrotherapeutic procedures.

The interpretation of the Visual Analogue Scale of Pain evidences a decrease in the patient's perception of the pain felt at the end of treatment compared to the beginning of treatment (Figs. 3, 4, 5, 6).

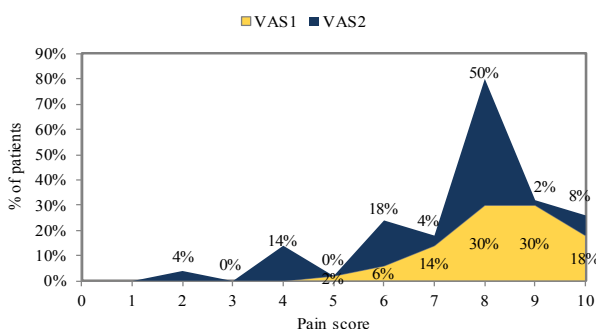
In patients with rheumatoid polyarthritis, the median VAS was 8 (7-9) on the initial examination and decreased to 6 (6-8) on the examination at the end of the first course of physical therapy; the decrease was statistically significant (the Wilcoxon test: Z statistics = 5.10;  $p < 0.0001$ ).



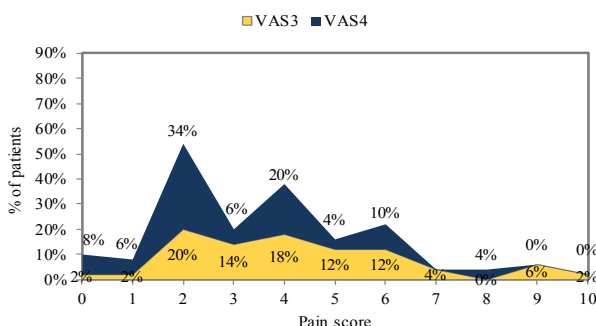
**Fig. 3** – Distribution of VAS at the beginning (VAS1) and end (VAS2) of the first course of treatment in patients with rheumatoid arthritis.



**Fig. 4** – Distribution of VAS at the beginning (VAS3) and end (VAS4) of the second course of treatment in patients with rheumatoid arthritis.



**Fig. 5** – Distribution of VAS at the beginning (VAS1) and end (VAS2) of the first course of treatment in patients with osteoarthritis.



**Fig. 6** – Distribution of VAS at the beginning (VAS3) and end (VAS4) of the second course of treatment in patients with osteoarthritis.

In patients with rheumatoid polyarthritis, the median VAS was 7 (5-8) 6 months after the first course of physical therapy and decreased to 6 (4-7) on the evaluation at the end of the second course of physical therapy; the decrease

was statistically significant (the Wilcoxon test: Z statistics = 4.56; p<0.0001).

In patients with osteoarthritis, the median VAS was 8 (8-9) on the initial examination and remained at the value of 8 (6-8) at the end of the first course of physical therapy; the values were statistically significant (the Wilcoxon test: Z statistics = 5.17; p<0.0001). The median VAS was 4 (2.25-5.75) 6 months after the first course of physical therapy and decreased to 2 (2-4) on the examination at the end of the second course of physical therapy, the decrease being statistically significant (the Wilcoxon test: Z statistics = 4.70; p<0.0001).

A summary of the results collected following the administration of the Health Assessment Questionnaire to patients with RA is shown in Table I.

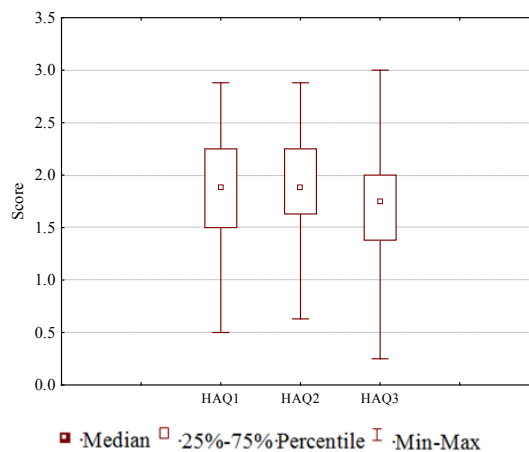
**Table I**

Results of the Health Assessment Questionnaire.

Statistical indicators	HAQ1 (n=50)	HAQ2 (n=50)	HAQ3 (n=50)
Minimum	0.50	0.63	0.25
Maximum	2.88	2.88	3.00
Median	1.88	1.88	1.75
1 <sup>st</sup> quartile	1.53	1.63	1.38
3 <sup>rd</sup> quartile	2.25	2.25	2.00

HAQ1 – before treatment; HAQ2 – at the end of the first course of treatment; HAQ3 – during the second course of treatment

For patients with RA, the Friedman ANOVA test identified statistically significant differences in HAQ scores (Chi-square statistics = 14.30, p = 0.00079; Fig. 7). Statistically significant differences were found when comparing initial data to those during the second course of treatment (Table II).



**Fig. 7** – Statistical comparison of the three HAQ scores in patients with RA

**Table II**  
Comparisons between HAQ1, HAQ2 and HAQ3 in patients with RA.

HAQ	Sign-value	p
HAQ1 vs. HAQ2	1.84 vs. 1.88	0.144
HAQ1 vs. HAQ3	1.84 vs. 1.67	0.049
HAQ2 vs. HAQ3	1.88 vs. 1.67	0.001

There were no statistically significant differences regarding HAQ or VAS scores in patients with electrotherapy compared to those with kinesiotherapy alone (Table III).



**Table III**

Results of the comparison of values between the groups of patients with and without electrotherapy (patients with RA).

HAQ/VAS	Electrotherapy 1				Electrotherapy 2			
	Z-value	p	n <sub>in</sub>	n <sub>ou</sub>	Z-value	p	n <sub>in</sub>	n <sub>ou</sub>
HAQ1	0.53	0.598	22	28	-0.01	0.991	17	28
HAQ2	0.44	0.660	22	28	0.27	0.788	17	28
HAQ3	0.14	0.892	22	23	-0.25	0.806	17	28
VAS1	0.31	0.755	22	28	-0.49	0.623	17	28
VAS2	-1.85	0.065	22	28	-1.44	0.150	17	28
VAS3	1.02	0.307	22	23	-1.09	0.276	17	28
VAS4	-0.91	0.364	22	23	-2.50	0.012	17	28

**Legend**

VAS1- beginning of the first course of rehabilitation treatment  
 VAS2 – end of the first course of rehabilitation treatment  
 VAS3 – beginning of the second course of rehabilitation treatment  
 VAS4 - end of the second course of rehabilitation treatment

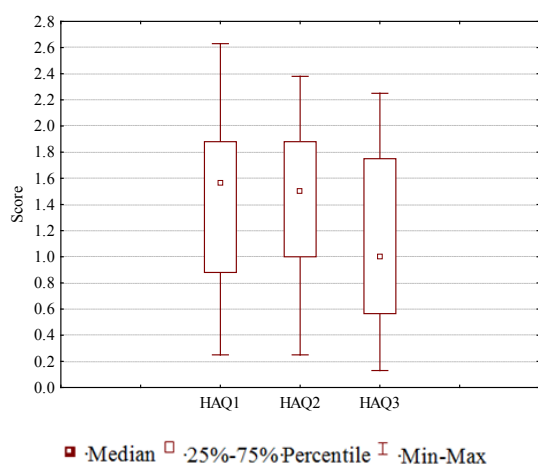
A summary of the results collected following the administration of the Health Assessment Questionnaire to patients with osteoarthritis is shown in Table IV.

**Table IV**

Results of the Health Assessment Questionnaire

Statistical indicators	HAQ1 (n=50)	HAQ2 (n=50)	HAQ3 (n=45)
Minimum	0.75	0.50	0.00
Maximum	2.43	2.25	1.88
Median	1.75	1.75	1.13
1 <sup>st</sup> quartile	1.50	1.25	0.75
3 <sup>rd</sup> quartile	2.00	2.00	1.38

The Friedman ANOVA test in patients with OA identified statistically significant differences in HAQ scores (Chi-square statistics = 62.21,  $p < 0.0001$ ; Fig. 8). Statistically significant differences were found when comparing initial data to data during the second course of treatment (Table V).



**Fig. 8** – Statistical comparison of the three HAQ scores in patients with osteoarthritis

**Table V**

Comparisons between HAQ1, HAQ2 and HAQ3 in patients with osteoarthritis.

HAQ	Sign-value	p
HAQ1 vs. HAQ2	1.32	0.188
HAQ1 vs. HAQ3	6.26	<0.001
HAQ2 vs. HAQ3	5.88	<0.001

**Discussions**

The EULAR 11th recommendation regarding the management of early arthritis refers to the possibility of using non-pharmacological methods such as dynamic exercises, occupational therapy, hydrotherapy as adjuvant treatments in patients with RA. Many randomized clinical studies have shown that specific dynamic exercises for the affected joints can improve muscle strength and joint mobility, without clear effects on pain or disease activity. So far, no consensus about the optimal kinesiotherapeutic program has been reached. Regarding electrotherapy, results are controversial or, when positive effects are reported, these are related to short-term pain relief (Combe et al., 2007).

In our study, in patients with RA, we found a decrease of HAQ and VAS values, but this decrease was not more pronounced in patients who underwent additional electrotherapeutic procedures ( $p > 0.05$ ).

Of the 50 patients in the RA group, 22 persons also underwent electrotherapy during the first course of physiotherapy; their number decreased to 17 during the second course, after 6 months; in contrast, the majority of patients with OA underwent electrotherapeutic procedures (50 patients in the initial stage, 46 on reevaluation), during both courses of therapy. The cause of the absence of electrotherapeutic procedures was the activity stage of the disease or the development of other comorbidities.

There are many literature studies regarding the effects of physiotherapy and kinesiotherapy in inflammatory rheumatism. In a study, Buljina et al. monitored the effects of physiotherapy (thermal baths, hot or cold applications, galvanic baths and exercises) on the rheumatoid hand in a group of 50 patients and found, at least in the short term, an improvement in the functional status of these patients (Buljina et al., 2001). Rapoliene and Krisciunas studied the effects of occupational therapy (physiokinesiotherapy and ADL education) in a group of Lithuanian patients and observed an improvement in hand function after completion of the treatment course, which facilitated the activities of daily living in these patients (Rapoliene & Krisciunas, 2006).

Electrotherapy is one of the most frequently used physical therapy methods in the treatment of RA. A recent study in Poland investigated the effects of these procedures on pain relief in these patients. A significant decrease of pain was found, particularly in the group of patients undergoing a combination of electrotherapeutic procedures (Lesniewicz et al., 2014).

Metsios shows that therapeutic interventions through well-designed physical exercise programs in patients with RA lead to a reduction of fatigue, an improvement of cardiovascular activity and physiological status and ameliorate mental well-being, without the aggravation of symptoms, without negative effects on the disease activity or joint damage (Metsios et al., 2008).

The patients included in the study showed compliance with physiokinesiotherapy, with positive effects on physical and mental well-being, as evidenced by HAQ and VAS values. In the initial stage, regarding pain perception in patients with RA, the median VAS was 8 (7-9) at the

beginning of the rehabilitation treatment and decreased to 6 (6-8) after the 10 physical therapy sessions performed; in patients with OA, the median VAS was 8 (8-9) and remained at the value of 8 (6-8). In the second stage, when repeating the course of physical therapy, the median VAS was 7 (5-8) and decreased to 6 (4-7) in patients with RA, while in patients with OA, the median VAS was 4 (2.25-5.75) and decreased to 2 (2-4), which suggests that physical therapy reduced pain in both groups, with more obvious results in patients with OA, after the second course of physical therapy. The quality of life was improved in both groups, with a significantly greater improvement on re-evaluation, when median values reached 1.75 compared to 1.88 in the group with rheumatoid arthritis (Fig. 7) and 1.13 compared to 1.75 in patients with osteoarthritis. No statistically significant results were obtained regarding the increase of the quality of life and the reduction of pain in patients with RA who underwent electrotherapy in addition to kinesiotherapy.

In medical practice, the most significant indicator of disability is considered to be HAQ – the indicator of functional disability (Sokka et al., 2010).

We found that group therapy improved global evolution, bringing benefits for some subjective indicators (anxiety, patient motivation). In a study performed in Sweden, Ottenvall Hammar and Hakkansson showed that by adapting their needs to their own level of physical functionality and strength, by using assistive equipment for the compensation of deficiencies, by adjusting the surrounding environment, with the help of people close to them, patients with rheumatic diseases could acquire a good health status. The results demonstrated that training, drug therapy and care provided by the team of rheumatologists were closely related to an improvement in ADLs and the perception of a good health state (Ottenvall Hammar & Hakkansson, 2013).

Patients were advised to take daily walks, with the increase of the walking distance, bike rides, or to participate in organized events and trips. These activities, in addition to physical and mental benefits, allow to fight stress and improve sleep, ameliorating the quality of life, which is also confirmed by Bacconnier's study (Bacconnier et al., 2015).

## Conclusions

1. A decrease in the values of HAQ and VAS scores at the end of the treatment period compared to the beginning of treatment was found in both groups.

2. Almost all patients with osteoarthritis underwent electrotherapeutic procedures, compared to the group of patients with RA (due to the contraindication given by the presence of marked inflammatory syndrome).

3. There were no statistically significant differences regarding HAQ and VAS scores in patients with RA who underwent electrotherapy compared to those without this treatment.

## Conflicts of interest

The authors declare no conflicts of interest.

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