

Physiotherapeutic intervention in pain and quality of life of women with rheumatoid arthritis. Case reports

Intervenção fisioterapêutica na dor e na qualidade de vida em mulheres com artrite reumatoide. Relato de casos

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ABSTRACT

BACKGROUND AND OBJECTIVES: Rheumatoid arthritis is an autoimmune, chronic, idiopathic and inflammatory disease that symmetrically affects the tissues, organs and peripheral joints causing pain, swelling, stiffness and decreased the quality of life. The objective of this study was to confirm the effects of a physiotherapeutic intervention program on pain and quality of life of women with rheumatoid arthritis.

CASE REPORTS: Study of a series of cases of five female patients, with average age \pm 54 years. The initial assessment consisted of data collection, pain assessment by visual analog scale and evaluation of the quality of life by the Medical Outcomes Study 36 Item Short-Form Health Survey SF-36. After the initial assessment, patients were subjected to a physiotherapeutic intervention program based on kinesiotherapy, which was conducted in groups, consisting of two sessions per week and duration of 50 minutes per session, totaling 10 sessions. The pain showed no statistically significant results when analyzed by the visual analog scale. However, when assessing the quality of life related to pain and vitality, there were statistically significant results ($p \leq 0.05$) in post-intervention.

CONCLUSION: The proposed intervention program has been effective in improving the pain and vitality domains regarding the analysis of the quality of life in women with rheumatoid arthritis.

Keywords: Pain, Physical therapy, Quality of life, Rheumatoid arthritis.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A artrite reumatoide é uma doença autoimune, crônica, idiopática e inflamatória que atinge simetricamente os tecidos, órgãos e as articulações periféricas causando dor, edema, rigidez e diminuição da qualidade de vida. O objetivo deste estudo foi verificar os efeitos de um programa de intervenção fisioterapêutica na dor e na qualidade de vida de mulheres com artrite reumatoide.

RELATO DOS CASOS: Estudo de uma série de casos de cinco pacientes do sexo feminino, com idade média de \pm 54 anos. A avaliação inicial consistiu na coleta de dados, na avaliação da dor pela escala analógica visual e na avaliação da qualidade de vida pelo Questionário *Medical Outcomes Study 36 - Item Short-Form Health Survey SF-36*. Após a avaliação inicial as pacientes foram submetidas a um programa de intervenção fisioterapêutica baseado em cinesioterapia, que foi realizado em grupo, com frequência de duas sessões semanais e duração de 50 minutos por sessão, totalizando 10 sessões. Quando analisada a dor pela escala analógica visual não houve resultados estatisticamente significativos. No entanto, na avaliação da qualidade de vida relacionada aos domínios dor e vitalidade, verificou-se resultados estatisticamente significativos ($p \leq 0,05$) na pós-intervenção.

CONCLUSÃO: O programa de intervenção proposto foi eficaz na melhora dos domínios dor e vitalidade referentes à análise da qualidade de vida em mulheres com artrite reumatoide.

Descritores: Artrite reumatoide, Dor, Fisioterapia, Qualidade de vida.

INTRODUCTION

Rheumatoid arthritis (RA) is an autoimmune, chronic, idiopathic and inflammatory disease that symmetrically affects tissues, organs and, especially, peripheral joints¹. Its worldwide prevalence ranges from 0.5 to 1%, similar to Brazilian literature, and may occur in all ethnic groups. It affects, especially, the female gender in the age group between 20 and 60 years old^{2,3}.

The main features of RA are chronic synovial inflammation and the presence of palpable rheumatoid nodules on physical examination, which conditions involve symmetrical joint edema, bone erosion, and joint cartilage destruction^{4,5}. Laboratory tests evidenced the rheumatoid factor presence, and radiographic examinations evidenced erosions and/or periarticular osteopenia in hands and wrists joints⁵.

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Individuals' clinical features present, mainly, strong morning or night pain in the proximal interphalangeal joints of hands, metacarpal and metatarsophalangeal joints in the wrists, shoulders, and knees. Other symptoms accompany the painful phenomenon, such as joint stiffness lasting at least one hour (morning or after long periods of immobilization), fatigue, discomfort, decreased strength and muscular endurance and physical deconditioning⁵⁻⁷.

Symptoms arising from the disease imply joint deformities and functional disability, which can lead individuals to functional dependence and limitations of their daily living activities. The more advanced the disease stage, the shorter the survival becomes⁸. Pain and inflammation associated with musculoskeletal disorders are the main factors responsible for the impact on the subject's quality of life (QoL), both in physical aspects and in mental aspects^{9,10}.

Physical conditions presented imply the need to develop strategies for RA treatment. Currently, several methods allow a satisfactory disease's handling. Among these, physiotherapy, especially kinesiotherapy, becomes a beneficial and viable strategy, aiming to relieve pain and combat inflammatory processes, to allow restoring articular movement amplitude and muscle activity, preventing new deformities onset, promoting physical, psychic and social well-being and, consequently, improving patients' QoL¹⁰⁻¹⁴.

This study aimed to verify the effects of a physiotherapeutic intervention program in pain and QoL of women with RA.

CASE REPORTS

It is a case-study that is part of a project called "Effects of physiotherapeutic treatment in patients with rheumatic diseases," approved by Ethics and Research Committee in Human Beings of *University of Passo Fundo (UPF)* under Protocol No. 348,381, which is in accordance with the Declaration of Helsinki of 1975.

Initially, the waiting list for ambulatory care in the UPF's Rheumatologic Physiotherapy Sector was consulted, which included 12 individuals with RA. Were considered eligible those with a RA clinical diagnosis, female, 18 years old or older, with physical and mental abilities to understand and perform the dynamics of the proposed physiotherapeutic exercises, that were not in an acute period of the disease, that were not performing physical therapy or any other form of therapeutic intervention for at least three months prior to data collection.

Among the individuals that were on the waiting list, only seven were able to integrate this study's casuistry. Physiotherapy sessions were held at the Physiotherapy Clinic of the School of Physical Education and Physiotherapy of the UPF between May and June 2015. All participants signed the Free Informed Consent Form (FICF), through prior explanation and clarification of doubts, agreeing to participate in the study.

Evaluator A performed data collection and other information regarding disease conditions and pain assessment using visual analog pain scale (VAS). This is a numerical scale from zero

(absence of pain) to 10 (worst pain imaginable), in which the individual is asked to quantitatively indicate the pain present at the time of evaluation¹⁵. Evaluator B performed the QoL evaluation by means of Quality of Life Questionnaire - Medical Outcomes Study 36 - Item Short-Form Health Survey (SF-36), gathering physical components (functional capacity, physical aspects, pain and the general state of health) and mental (vitality, social aspects, emotional aspects and mental health). The final score of each domain ranges from zero (worse general state of health) to 100 (best general state of health)¹⁶.

After evaluations and initial data collection, the subjects performed 10 sessions of physiotherapy in a group, with a frequency of 2 times a week and average duration of 50 minutes. In total, including the initial and final meetings for evaluation and re-evaluation, 12 meetings were held with the study participants. The physiotherapeutic technique choice adopted in this study was based on literature-referenced data^{10,17}. Kinesiotherapy was the technique chosen, and the intervention program was designed aiming its effects on pain and QoL of patients with RA. Based on the foregoing, the exercises listed in this study followed the order:

1. Slow and maintained muscle stretching in an active-assisted or passive way of the main muscle groups of upper limbs, lower limbs, and trunk (20 seconds for each muscle group);
2. Strengthening of upper limbs (muscle groups: flexors, extensors and shoulder abductors and flexors and elbow extensors) and lower limbs (muscle groups: plantiflexors, dorsiflexors, inversors and ankles evertors) with pink elastic band progressing to green and blue (3 sets of 10 repetitions for each muscle group);
3. Pulmonary expansion exercise, in diaphragmatic pattern, with the aid of a stick (3 respiratory cycles of 5 repetitions);
4. Strengthening of posterior trunk muscles with elastic bands in pink, green, blue or purple (3 sets of 10 repetitions);
5. Strengthening of muscles responsible for flexion, extension, ulnar deviation and radial deviation of wrists with elastic bands in pink, green or blue (3 sets of 15 repetitions);
6. Strengthening of hands and fingers with wrist and finger strengthener, whose resistance varied from 1.4 to 4.1kgf (2 sets of 15 repetitions), and proprioceptive pellets with light and moderate resistance (3 sets of 20 repetitions);
7. Fine-motor exercise with therapeutic masses of modeling, where the patients performed tweezers movements with all fingers (5 minutes performing this movement);
8. Weight transfer exercise for upper limbs on a mat (3 sets of 5 repetitions per side);
9. Balance and proprioception exercises, by means of mini-squats in bipodal and unipodal support and displacement of body weight on the lower limbs, initially in soil and, later, on destabilizing platforms (foam balance pad, rubberized balance pad with disc shaped proprioceptive surface and trampolines) (3 sets of 10 repetitions);
10. Relaxation in 65cm Swiss balls, to lengthen the trunk's muscular chains and the neck's muscles. Circulation movements of head and shoulders were also performed (20 seconds each muscle group).

After the sessions, the pain and QoL parameters were reassessed and the data collected in the pre- and post-intervention phases were cataloged in Windows Microsoft Excel 2013. Two patients initially selected were excluded. The first one was due to a surgical procedure performed during the physiotherapeutic intervention (which was not related to the study) and the second due not performing the 10 proposed physiotherapy sessions, both of which performed only seven physiotherapy

sessions. Thus, five women with RA (patients A, B, C, D, and E) concluded the study. The average age of participants was 54.0±3.8 years, the diagnosis time of the disease was 15.0±2.9 years, and the main complaint reported by them was a chronic pain in the hands, where they had articular deformities. Selected patients' characterization is described in table 1.

Regarding the patients' profile, it was observed that the majority of the sample had three or more children (60%) and was single (60%). As for schooling and their work activities, the majority reported having elementary education only (60%) and being inactive in the labor market (60%). All patients used continuous drugs and reported having associated diseases. Moreover, the majority of the sample had a family history of rheumatic disease (80%).

Table 2 presents the data on pain measured by VAS, before and after the physiotherapeutic intervention.

Through VAS, it was observed that three patients (A, C and D) presented a decrease in pain intensity. Although two other patients (B and E) did not present a decrease in this parameter, they did not present an increase in the symptomatic picture.

Table 3 presents the data regarding QoL according to SF-36, pre- and post-intervention physiotherapeutic.

In general, two patients (A and C) showed improvement in all QoL domains, two patients (B and D) presented improvement of domains, with the exception of functional capacity (B), limitations by physical aspects (B) and social aspects (D), and one patient presented QoL improvement in only three domains (E). Still, it is observed that only pain and vitality domains showed improvement in all cases presented.

Table 1. Selected patients' characterization

	Variables	Representation (n and %)
Schooling	Elementary school	3 (60)
	High school	1 (20)
	Higher education	1 (20)
Children	No children	0 (20)
	1	-
	2	1 (20)
	3 or more	3 (60)
Marital state	Married	2 (40)
	Single	3 (60)
Occupation	Inactive	3 (60)
	Active	2 (40)
Drug use	Yes	5 (100)
	No	-
Associated diseases	Yes	5 (100)
	No	-
Family history of rheumatic disease	Yes	4 (80)
	No	1 (20)

n = absolute value; % = relative value.

Table 2. Pain pre- and post-intervention physiotherapeutic

	Pre-intervention	Post-intervention
Patient A	8	6
Patient B	6	6
Patient C	7	3
Patient D	5	3
Patient E	6	6

Table 3. Quality of life pre- and post-intervention physiotherapeutic

Domains	Patient A		Patient B		Patient C		Patient D		Patient E	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Functional capacity	35	45	05	20	25	50	10	25	65	60
Physical aspects limitation	25	100	0	0	25	100	0	100	0	0
Pain	10	20	20	61	30	51	31	41	10	20
General health status	40	55	40	57	55	67	32	35	45	0
Vitality	25	50	50	70	40	65	30	70	30	45
Social aspects	25	50	50	100	50	65.2	75	62.5	65.2	87.5
Emotional aspects limitation	0	33.3	100	66.6	33.3	100	0	100	100	66.6
Mental health	24	28	96	100	40	68	32	76	56	52

Pre = pre-intervention; Post = post-intervention.

DISCUSSION

RA is a disease with unknown etiology attacking women preferentially. Although it can start at any age, there is a predisposition to the onset of symptoms around 40 years old¹⁸. Pain is the most common complaint among the patients, manifested by acute polyarthritis (70% of cases) and persistent synovitis in hands (91% of cases), accompanied by edema of distal joints (proximal interphalangeal and metacarpophalangeal in more than 90% of cases), by prolonged morning stiffness and muscle weakness^{1,19-21}. In addition, individuals with RA have lower oxygen concentrations in the muscles of hands and arms, whi-

ch can lead to soft tissue changes, tendons degeneration and deformities' exacerbation²². Which is in line with the present study, since the patients reported chronic pain in hands as the main complaint, where they also presented deformities.

Chronic pain affects 54.2% of people between 60 and 64 years old, 55.9% of people between 65 and 69 years old, 65.7% of people between the ages of 70 and 74 and 62.5% of people with more than 75 years old. In addition, 35% of people with chronic pain report a moderate or severe disability and impact mainly on domestic, leisure and occupational activities and sleep quality²³. The chronicity condition persists beyond the physiological recovery period of the injured tissue, generating a negative impact on the individual's physical and cognitive abilities, well-being and QoL. Chronic pain treatment, unlike the therapies for acute pain (rest and drugs), is composed of physical exercise and multidisciplinary treatment⁴.

It was observed that besides reporting the chronic pain as a major complaint, the patients of this study were going to the third decade of life. Thus, it is possible to justify the physiotherapeutic intervention program proposal, which sought to keep them moving, as the painful condition seems to have exerted an influence on the QoL, since individuals who presented a decrease in pain had an increase in the scores of QoL's domains (A, C and D). Although patient B showed no decrease in pain by VAS, there was an increase in six domains of QoL, including the pain domain.

As a complement to physical therapy, patients were taking methotrexate, one of the drugs most commonly used to treat individuals with RA. It is a drug that modifies the disease course and is well tolerated by its patients, which in addition to reducing the signs and symptoms of disease activity, blocks the radiographic lesions progression, and may help improve the functionality of its users²⁴.

According to the patients, the cold can act as an exacerbator of the painful symptoms. Numerous mechanisms and effects may be influenced by cognitive, physical and behavioral artifacts during physical therapy, which may interfere with the treatment of individuals with arthralgias²⁵. The physiotherapeutic intervention was performed in late autumn and early winter in a region of southern Brazil, a cold place at this time of year. Perhaps, this may justify the fact that there was no change in the pain intensity of B and E patients, and improvement of most domains of QoL of patient E after the intervention.

Another factor that may have contributed to the pain of VAS not having decreased in B and E patients in the post-intervention phase would be the fact that joint and ligament instability are consequences arising from the painful situation and can have a significant impact on the individual's biomechanical and directly influence the rehabilitation process²⁶. In addition, perhaps the number of kinesiotherapy sessions performed may not have been enough to attenuate musculoskeletal instability and to obtain satisfactory results of these patients with exacerbated symptoms. Given that individuals with chronic inflammatory arthritis have conditions of hypotrophy and muscle weakness, often due to the reduction of physical capacity and the continuous use of glucocorticoids²⁷, physiotherapy is a beneficial resource that

can be used in all phases of the disease, aiming to improving joint mobility, muscle strength and coordination, flexibility, fatigue resistance, aerobic capacity and, finally, preserving and/or restoring general functional ability. In this sense, kinesiotherapy uses the movement of the human body to provide such benefits^{28,29}. This suggests the idea of an alternative therapy establishment, such as physical exercise (especially kinesiotherapy) in the daily life of the individual with RA, allowing him to remain as functional as possible within the limitations imposed by the disease.

It is recommended that physical exercise lasts for 20 minutes or more, being performed at least twice a week and leads to an increase of 60% of the predicted heart rate for the age, to present positive clinical effects and without detriment to the disease, that is, without worsening the disease's activity and without causing pain. When the dynamic exercise is compared to the conventional joint rehabilitation program, it can be observed that dynamic exercise significantly improves the QoL of individuals with RA^{30,31}. Although interventions were carried out with a frequency of two weekly sessions (averaging 50 minutes each), the present study used a rehabilitation program through physical exercise and found beneficial results on patients' pain and QoL, especially in the pain domains and vitality.

This study's results with regard to pain and QoL of RA patients submitted to a physiotherapeutic intervention program based on kinesiotherapy agree with other reports presented in the literature. A woman with RA was submitted to a physiotherapeutic intervention program based on kinesiotherapy with elastic bands, hand strengthening, global stretching, joint mobilizations, and balance and proprioception exercises. After 15 sessions of physiotherapy, there was a considerable decrease in pain and improvement or maintenance of QoL (especially in the pain domain)¹⁰. Another case study involving a man with RA revealed that after performing 15 sessions of kinesiotherapy, significant improvement of pain occurred, resulting in improvement of QoL without worsening the clinical picture¹⁷. Twenty women with RA and those with deformities were submitted to a protocol of muscle strengthening exercises. The study was randomized into an experimental group, which performed 20 physiotherapy sessions with muscle strengthening exercises, and in a control group. After physiotherapy sessions, the experimental group achieved significant gains in the functionality and muscular strength of the studied individuals⁶. Since the patients in the present study had deformities, they chose muscle-strengthening exercises, allowing them to remain functional and in order to improve their QoL.

CONCLUSION

The proposed intervention program was beneficial in improving pain and QoL in RA women.

REFERENCES

1. Wibelinger LM, Dal Molin V, Myra RS, DeMarco M. Perfil de uma população portadora de artrite reumatoide em um município do interior do Rio Grande do Sul. EFDportes.com, Revista Digital. 2015;19(202). Disponível em: <http://www.efde-

- portes.com/efd202/populacao-portadora-de-artrite-reumatoide.htm>. Acesso em: 22 de outubro de 2015.
2. Brenol CV, Monticiflo OA, Xavier RM, Brenol JC. Artrite Reumatoide e Aterosclerose. *Rev Assoc Med Bras.* 2007;5(53):465-70.
 3. Suzuki A, Yamamoto K. From genetics to functional insights into rheumatoid arthritis. *Clin Exp Rheumatol.* 2015;33(4):40-3.
 4. Souza JB. Poderia a atividade física induzir analgesia em pacientes com dor crônica? *Rev Bras Med Esporte* 2009;15(2):145-50.
 5. Kulkamp W, Dario AB, Gevaerd MS, Domenech SC. Artrite reumatoide e exercício físico: resgate histórico e cenário atual. *Rev Bras Ativ Fis Saúde.* 2009;14(1):55-64.
 6. Khurana R, Berney SM. Clinical aspects of rheumatoid arthritis. *Pathophysiol.* 2005;12(3):153-65.
 7. Sokka T, Makinen H. Remission makes its way to rheumatology. *Arthritis Res Ther.* 2010;12(4):129.
 8. Mota LM, Cruz BA, Brenol CV, Pereira IA, Fronza LS, Bertolo MB, et al. Consensus of the Brazilian Society of Rheumatology for diagnosis and early assessment of rheumatoid arthritis. *Rev Bras Reumatol.* 2011;51(3):199-219.
 9. Knob B, Jorge MSG, Zanin C, Wibelinger LM. Fisioterapia na qualidade de vida de indivíduos com artrite reumatoide: revisão sistemática. *ConScientiae Saúde.* 2016;15(3):489-94.
 10. Myra RS, DeMarco M, Zanin C, Wibelinger LM. Intervenção cinesioterapêutica na qualidade de vida, dor e força muscular de paciente portador de artrite reumatoide e lúpus eritematoso sistêmico. *Relato de caso. Rev Dor.* 2015;16(2):153-5.
 11. Bertolo MB, Brenol CV, Schainberg CG, Neubarth F. Atualização do Consenso Brasileiro no Diagnóstico e Tratamento da Artrite Reumatóide. *Temas de Reumatol Clin.* 2009;1(10):6-14.
 12. Iversen MD, Brawerman M, Iversen CN. Recommendations and the state of the evidence for physical activity interventions for adults with rheumatoid arthritis: 2007 to present. *Int J Clin Rheumatol.* 2012;7(5):489-503.
 13. Wells AF, Jodat N, Schiff M. A critical evaluation of the role of subcutaneous abatacept in the treatment of rheumatoid arthritis: patient considerations. *Biologics.* 2014;8(1):41-55.
 14. Williams MA, Williamson EM, Heine PJ, Nichols V, Glover MJ, Dritsaki M, et al. Strengthening And stretching for Rheumatoid Arthritis of the Hand (SARAH). A randomised controlled trial and economic evaluation. *Health Technol Assess.* 2015;19(19):1-222.
 15. Martinez JE, Grassi DC, Marques LG. Análise da aplicabilidade de três instrumentos de avaliação de dor em distintas unidades de atendimento: ambulatório, enfermaria e urgência. *Rev Bras Reumatol.* 2011;51(4):304-8.
 16. Ferreira LR, Pestana PR, Oliveira J, Mesquita-Ferrari RA. Efeitos da reabilitação aquática na sintomatologia e qualidade de vida de portadoras de artrite reumatoide. *Rev Fisioter Pesq.* 2008;15(2):136-41.
 17. Dal Molin V, Myra RS, Possebom V, Vieira G, Wibelinger LM. Intervenção fisioterapêutica em paciente portador de artrite reumatoide: um estudo de caso. *EFDdesportes.com, Rev Digital.* 2015;20(209). Disponível em: <http://www.efdesportes.com/efd209/intervencao-fisioterapeutica-artrite-reumatoide.htm>. Acesso em: 18 de outubro de 2015.
 18. Wibelinger LM, (editor.) *Fisioterapia em Reumatologia.* 2ª Ed. Rio de Janeiro: Revinter; 2014. 39-60p.
 19. Walsh DA, McWilliams DF. Mechanisms, impact and management of pain in rheumatoid arthritis. *Rev Bras Reumatol.* 2012;10(10):581-92.
 20. Pereira IA, Mota LM, Cruz BA, Brenol CV, Fronza LS, Bertolo MB, et al. 2012 Brazilian Society of Rheumatology Consensus on the management of comorbidities in patients with rheumatoid arthritis. *Rev Bras Reumatol.* 2012;52(4):483-95.
 21. Venables P, Maini R. Clinical features of rheumatoid arthritis. 2012.
 22. Cima SR, Barone A, Porto JM, Abreu DC. Strengthening exercises to improve hand strength and functionality in rheumatoid arthritis with hand deformities: a randomized, controlled trial. *Rheumatol Int.* 2013;33(3):725-32.
 23. Azevedo LF, Costa-Pereira A, Mendonça L, Dias CC, Castro-Lopes JM. Epidemiology of chronic pain: a population-based nationwide study on its prevalence, characteristics and associated disability in Portugal. *J Pain.* 2012;13(8):773-83.
 24. Laurindo IMM, Ximenes AC, Lima FAC, Pinheiro GRC, Batistella LR, Bertolo MB, et al (2004). Artrite reumatóide: diagnóstico e tratamento. *Rev Bras Reumatol.* 2004;44(6):435-42.
 25. Gosling AP. Mecanismos de ação e efeitos da fisioterapia no tratamento da dor. *Rev Dor.* 2013;13(1):65-70.
 26. Henriksen M, Alkjaer T, Lund H, Simonsen EB, Graven-Nielsen T, Danneskiold-Samsøe B, et al. Experimental quadriceps muscle pain impairs knee joint control during walking. *J App Physiol.* 2007;103(1):132-9.
 27. Balsamo S, Santos-Neto L. Fatigue in systemic lupus erythematosus: An association with reduced physical fitness. *Autoimmun Rev.* 2011;10(9):514-8.
 28. Kavuncu V, Evcik D. Physiotherapy in rheumatoid arthritis. *Med Gen Med.* 2004;6(2):3.
 29. Florentino DM, De Sousa FR, Maiworn AI, Carvalho AC, Silva KM. A fisioterapia no alívio da dor: uma visão reabilitadora em cuidados paliativos. *Rev Hosp Univ Pedro Ernesto.* 2012;11(2):50-7.
 30. Baillet A, Payraud E, Niderprim VA, Nissen MJ, Allenet B, François P, et al. A dynamic exercise programme to improve patients' disability in rheumatoid arthritis: a prospective randomized controlled trial. *Rheumatology.* 2009;48(4):410-5.
 31. Munneke M, de Jong Z, Zwinderman AH, Runday HK, Van Schaardenburg D, Dijkmans BA, et al. Effect of a high-intensity weight-bearing exercise program on radiologic damage progression of the large joints in subgroups of patients with rheumatoid arthritis. *Arthritis Rheum.* 2005;53(3):410-17.