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Review article

Monitoring the functional capacity of patients with rheumatoid arthritis for three years



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ABSTRACT

Objective: To quantify modification of functional capacity in a three-year period in a group of patients with rheumatoid arthritis (RA) using HAQ and EPM-ROM inventories.

Methods: Forty patients with RA on methotrexate (MTX) as disease-modifying antirheumatic drug (DMARD) were followed for up to three years. The functional status was assessed at the beginning and end of the period by HAQ and EPM-ROM.

Results: Thirty-two patients were retrieved, with initial HAQ score of 1.14 ± 0.49 (mean \pm SD) and EPM-ROM score of 5.8 ± 2.75 . After an average period of three years, the HAQ score was 1.13 ± 0.49 and EPM-ROM score, 6.81 ± 3.66 . In the subgroup of seven patients submitted to orthopedic surgery, HAQ score decreased from 0.84 ± 0.72 to 1.64 ± 0.56 and the EPM-ROM score, from 5.8 ± 1.80 to 8.3 ± 0.74 . In the subgroup of non-operated patients, HAQ score varied from 1.2 ± 0.45 to 1.07 ± 0.70 and EPM-ROM score, from 5.7 ± 3.06 to 6.4 ± 3.90 .

Conclusion: In a group of RA patients in use of only MTX as DMARD, there was little change on HAQ score and EPM-ROM scores over the average period of three years. Worsening functional capacity was observed in the group of operated patients in comparison to the not operated ones. This fact alerts us to the need for use of broader therapeutic regimens availability of musculoskeletal surgeries in a timely manner in patients with RA.

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Acompanhamento da capacidade funcional de pacientes com artrite reumatoide por três anos

RESUMO

Objetivo: Quantificar a modificação da capacidade funcional em um período de três anos em um grupo de pacientes com artrite reumatoide (AR), utilizando os inventários HAQ e EPM-ROM.

Métodos: Quarenta pacientes com AR em tratamento com metotrexato (MTX) como fármaco antirreumático modificador da doença (DMARD) foram acompanhados por até três anos. O estado funcional foi avaliado no início e no final do período por HAQ e EPM-ROM.

Palavras-chave:

Artrite reumatoide

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Resultados: Trinta e dois pacientes foram recuperados, com escore HAQ inicial de $1,14 \pm 0,49$ (média \pm DP) e EPM-ROM de $5,8 \pm 2,75$. Após um período médio de três anos, o HAQ foi de $1,13 \pm 0,49$ e EPM-ROM em $6,81 \pm 3,66$. No subgrupo de sete pacientes submetidos a cirurgia ortopédica, o HAQ diminuiu de $0,84 \pm 0,72$ para $1,64 \pm 0,56$; e o EPM-ROM, de $5,8 \pm 1,80$ para $8,3 \pm 0,74$. No subgrupo de pacientes não operados, o HAQ variou de $1,2 \pm 0,45$ para $1,07 \pm 0,70$; e o EPM-ROM, de $5,7 \pm 3,06$ para $6,4 \pm 3,90$.

Conclusão: Em um grupo de pacientes com AR medicados apenas com MTX como DMARD, houve pouca mudança nas pontuações HAQ e EPM-ROM durante o período médio de três anos. Observou-se agravamento da capacidade funcional no grupo de pacientes operados, em comparação com os não operados. Este fato nos alerta para a necessidade do uso de esquemas terapêuticos mais abrangentes e de maior disponibilidade de cirurgias musculoesqueléticas, em tempo hábil, em pacientes com AR.

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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease in which the joint inflammation presents as synovitis. The inflammation causes joint pain, swelling, and stiffness, as well as systemic symptoms such as fatigue, weight loss and anemia. The synovitis is the main factor that leads to joint destruction and, if untreated, may progress to serious joint damage, with loss of functional capacity.¹

RA is a condition that affects approximately 0.5–1% of the adult population worldwide, and its occurrence is observed in all ethnic groups. There is a predominance of females (two to three times, compared to males), occurring mainly in patients between the fourth and sixth decades of life, although there are occurrences of RA in all age groups.²

The negative consequences for physical functioning in RA patients are multidimensional, with loss of muscle strength and endurance, besides the loss of range of motion (ROM) of joints, due to changes caused by the disease. For a proper understanding of the situation of the patient, a multifaceted view is required, because the only use of laboratory tests will not allow a comprehensive assessment of his/her functional capacity.³

Functional capacity is a key factor of morbidity and a predictor of mortality⁴ in RA patients. The Health Assessment Questionnaire (HAQ) is a commonly used tool to assess the functional status in RA patients, but some studies have shown an inverse relationship between sensitivity to change in HAQ and disease duration, so that the duration of the disease influences the degree of functional improvement.⁵

HAQ was developed by Fries et al. (1980)⁶ to assess functional capacity in RA; and the dysfunction occurs early in the disease, due to factors that are not entirely clear.

The pain per se can lead to functional loss, even in the absence of radiological changes, which only become evident with the persistence of synovitis.⁷ HAQ has been translated and validated into many languages, including Brazilian Portuguese by Ferraz et al. in 1990.⁸

Functional capacity in RA can also be assessed by EPM-ROM, which is a standardized measure of the potential range of motion of joints in upper and lower limbs.⁹ The scale assesses ROM of 10 large-and-small, right-and-left joints by using a goniometer.¹⁰

The progression of joint dysfunction occurs in a subclinical, slow and progressive way in the different stages of the disease, which complicates the acceptance of surgical indication by RA patients. However, the indication of surgery must be done early, in order to avoid the onset of joint deformities.¹¹

In our environment, there are no studies on the long-term outcome of functional capacity in RA patients who were not treated with biologicals. This study portrays the situation of availability of musculoskeletal surgeries performed in a timely fashion in patients seen in the Public Health Service.

“In our country there are no studies on the long-term outcome of functional capacity of patients with RA taking biologic medication. This study portrays the situation of availability of musculoskeletal surgeries in a timely fashion in patients seen in the Public Health Service. Considering that HAQ and EPM-ROM may reflect the changes in functional capacity over time,¹² this study assessed the modification of the indices in question as a result parameter of indication of orthopedic surgery within a 3-year period in RA patients.”

Objectives

This study aims to quantify the change in the functional capacity of RA patients treated routinely at our Service of Rheumatology, Universidade Federal de São Paulo.

Methods

This prospective study involved 40 RA patients according to American College of Rheumatology criteria,¹³ all aged over 18 years at disease onset. All patients were informed on the content of the research and agreed to participate in the study by signing a consent form. RA patients in functional classes 2 and 3¹⁴ treated with corticosteroids, nonsteroidal anti-inflammatory drugs, and methotrexate as disease-modifying antirheumatic drug (DMARD) were included in this study. Patients who used other DMARDs, or those with some pathology that would interfere with their movement, e.g., other musculoskeletal or neurological disorders, fractures with joint deformity, or with congenital malformation were excluded. Patients with diabetes mellitus and alcohol or illegal drug

users were also excluded. Our patients were selected sequentially, being inquired about duration of the disease, presence of morning stiffness (in minutes) and medications used at the time of enrollment. The overall clinical assessment and the counting of inflamed joints were performed by a rheumatologist, and HAQ and EPM-ROM tools were applied by one of the authors of this study (Oliveira LM). After an average 3-year period, 32 of those patients still being monitored at the outpatient service of Rheumatology, Universidade Federal de São Paulo, were reassessed.

Considering the occurrence of a 10% loss of functional capacity even in healthy individuals after the age of 50,¹⁵ we set the rate of loss of functional capacity expected by HAQ in RA in 20%. Thus, we compared baseline and final assessment data with respect to the loss of function, using HAQ (greater or lesser than 20%) and with respect to whether or not perform a surgery.

Continuous data were presented as mean (standard deviation – SD) and minimum and maximum values. Categorical data were expressed as absolute number and percentage. For the comparison between baseline and final assessments of variables (e.g., medications in use and function loss greater or lesser than 20% measured by HAQ), the chi-square or Fisher's exact test was used.

Comparisons between continuous variables, such as HAQ and EPM-ROM scores and HAQ and EPM-ROM score changes, were only descriptive, due to the limitation imposed by the sample size. The correlation between variables was performed using the Spearman test.

The statistical package SPSS, version 15.0, was used, and significance was set at 5%.

Results

After a 3-year period, of those 40 patients included in the study we could reassess 32 subjects. Thus, eight patients were not reassessed: three had died and five failed to visit the service of Rheumatology. The characteristics of the group are shown in [Table 1](#).

Seven patients underwent orthopedic surgery during the time period of this study and their data are described in [Table 2](#). [Table 3](#) shows the values for HAQ and EPM-ROM for patients submitted or not to surgery. Of the seven patients surgically treated, four underwent more than one procedure. The operations performed in the upper limbs ($n=5$) were: synovectomy in three patients, wrist fixation in one patient, and metacarpophalangeal prosthesis application in one patient. The surgeries performed in the lower limbs ($n=9$) were: synovectomy in the foot of a patient, a talocalcaneal fixation on another and knee prosthesis application in three patients. [Table 4](#) shows the comparison of patients stratified with respect to loss of function by HAQ and whether or not a surgery was performed.

With respect to surgery procedures, although the frequency of patients who had greater than 20% loss of functional capacity was not significant (Fisher, $P=0.16$), those patients who underwent surgery had a three times greater risk of suffering loss of functional capacity greater than 20% during the

Table 1 – Clinical and demographic characteristics.

Gender (women/men)	29:3
Average age (years)	53.8 (13)
Min/Max	28–75 years
Race, n (%)	
White	15 (46.9)
Mixed race (“pardos”)	12 (37.5)
Black	3 (9.4)
Oriental	2 (6.3)
Duration of illness	12.2 (7.4)
Min/Max	4–33 years
Number of inflamed joints	5 (7.1)
HAQ, baseline	1.14 (0.49)
HAQ, final	1.13 (0.49)
EPM-ROM (DP), baseline	5.8 (2.75)
EPM-ROM (DP), final	6.81 (3.66)
Methotrexate (%)	23 (73.6)

Continuous data expressed as mean (SD), minimum and maximum values.

Categorical data in absolute numbers, n (percentage).

study period (hazard ratio = 3.42) compared with patients not operated.

A correlation was noted between number of inflamed joints and baseline EPM-ROM score (0.46); between baseline EPM-ROM and baseline HAQ (0.46); between final EPM-ROM score and disease duration (0.45); and between disease duration and EPM-ROM change (difference between baseline and final scores). A strong correlation was noted between final HAQ score and HAQ change (0.74), influenced by the subgroup of patients who underwent surgery ([Table 5](#)).

Discussion

This prospective study involved 32 RA patients aged over 18 years at disease onset and with moderate functional impairment according to HAQ and EPM-ROM scores. After a mean follow-up of three years, the frequency of patients who had greater than 20% loss of functional capacity was

Table 2 – Characteristics of RA patients who underwent surgery during the study period.

	Conservative treatment	Surgery
Gender (women/men)	22:3	7:0
Age (years)	50.0	49.7
Min/Max	28–75	31–69
Disease duration (years)	11.3	14.2
Min/Max	4–33	8–23
Morning stiffness (minutes)	29.2	23.5
Min/Max	0–360	0–120
Number of inflamed joints	5.2	7
Min/Max	0–26	0–30

Average, minimum and maximum values.

Categorical data in absolute numbers, n.

Table 3 – HAQ and EPM-ROM scores for patients who were or not submitted to orthopedic surgery.

	Baseline	Final	Methotrexate use
Surgery n = 7	HAQ 0.84 (0.72) EPM-ROM 5.8 (1.80)	HAQ 1.64 (0.56) EPM-ROM 8.3 (0.74)	4 (57%)
Without surgery n = 25	HAQ 1.20 (0.45) EPM-ROM 5.7 (3.06)	HAQ 1.07 (0.70) EPM-ROM 6.4 (3.90)	21 (84%)

Data expressed as mean (SD).

Table 4 – Loss of function as measured by HAQ after three years of progression.

Loss of function	>20%	<20%
Surgery	4 (57%)	3 (43%)
Without surgery	7 (28%)	18 (72%)

Data in absolute numbers and percentages.

not significant. Patients who underwent surgery had a three times greater risk of functional capacity loss greater than 20% during the study period compared with not surgically treated patients.

Our data indicate a relative score stability, not only for HAQ,¹⁶ but also for EPM-ROM over time. Although extensively used, the exclusive use of HAQ has proven more suitable to evaluate RA activity,¹⁷ while EPM-ROM is a more sensitive tool to changes in functional capacity.¹⁰ The use of EPM-ROM in this study has provided objective data about the ROM needed to performing activities of daily living. In fact, the EPM-ROM score is sensitive to the modification of functional status, translating the goniometry required to perform the basic activities of life.¹⁷

Even in healthy individuals, there is loss of functional capacity throughout life;¹⁸ and in RA patients, such a loss is more significant.¹⁹ In our sample of RA patients with a mean age of 58 years, an HAQ score of 1.1 is equivalent to the score for people aged 85 years.¹⁸ Sokka et al., assessing functional capacity in RA patients, established that HAQ values smaller than 1 would mean a milder disease, while values above 2 would suggest a severe illness.¹² The annual increase in HAQ score found by these authors was confirmed by Scott et al. These authors found an annual increase of 1% in HAQ score.²⁰ Although the literature considers a 0.24-change in HAQ as clinically relevant,²¹ reductions of 0.19 can already be considered as minimal improvement in function.²⁰

The functional capacity measured by HAQ is influenced not only by age or duration of disease, but also by levels of pain

and medications used. In Brazilian patients, there was a faster progression in HAQ scores compared to Spanish patients. This finding was attributed to the difference in the pain assessment and medications used.²¹ At that time, there was scarce access to biologic drugs in several centers in Brazil, while in Spain these medications were already widely available.

HAQ can predict the severity and dysfunction caused by RA during the progression of the disease – which is not evident with the use of other clinical measures. The functional loss after five years is related to female gender, older age at disease onset, HAQ >1 in the first assessment, comorbidities and depression.¹⁶ In addition to a positive correlation with disease duration, HAQ presents also a negative correlation with socioeconomic status.²⁰

In the present study, we observed a slight improvement in functional capacity measured by HAQ in the group of patients who did not undergo surgery and a significant worsening in the operated group. One can interpret this finding as a difference in disease severity between groups. Allegedly, the group not operated would suffer a less aggressive disease, although with a disease duration similar to that of the operated group. Thus, the more favorable progression of the non-operated group may reflect a condition more susceptible to control by medication. A worsening of both HAQ and EPM-ROM scores was observed in the RA group who underwent orthopedic surgery, denoting that their surgery may have occurred late, when the anatomical deformities (e.g., musculoskeletal impairment) already installed would prevent functional improvement of the joint.

Back when the patients in this study showed the first symptoms of RA, biologicals were not available in the Public Health Service. Currently the importance of the early use of DMARDs and biologicals in controlling the course of the disease in its first years has already been established. This window of opportunity may have been lost by the patients in this study, who had only methotrexate available as DMARD. Our findings agree with Sokka et al.'s, which emphasize the positive impact of an early use of DMARDs in functional capacity measured

Table 5 – Correlations found among clinical data.

	Baseline EPM-ROM scoring	Final EPM-ROM scoring	EPM-ROM change	HAQ change
Inflamed joints (n)	0.46	NS	NS	NS
Duration of disease	NS	0.45	0.48	NS
HAQ, baseline	0.46	NS	NS	NS
Final HAQ scoring	NS	NS	NS	0.74
EPM-ROM, baseline	NS	0.53	NS	NS

Spearman correlation, NS, not significant.

by HAQ. We can add to this the finding that functional disability was a predictor factor of mortality in RA.¹² Pain and joint mobility are considered as important factors limiting the functional capacity of RA patients.^{3,22,23} The loss of functional capacity occurs early in the disease, with the presence of acute inflammation.²⁴ With the early use of DMARDs and after controlling the disease activity, a functional recovery occurs, followed by structural lesions that settle slowly and cumulatively. Thus, the functional deterioration may occur even before the radiographic changes, which become relevant after a lapse of five years from the onset of the disease.^{7,20}

An inverse correlation between HAQ score and ROM of some joints, e.g. wrists, shoulders and knees, was observed.²⁴ EPM-ROM takes into account the ROM ranges needed to perform wide-ranging functions, and not just a percentage of amplitude loss caused by the disease, which can differ depending on the joint.⁸ Our data show the expected correlation between the baseline evaluation by EPM-ROM and the number of inflamed joints. We also noted an EPM-ROM variation with the duration of disease, showing worsening in joint mobilization capacity after a 3-year period.

In subjects with joint impairment consolidated by a disease duration longer than 12 years, EPM-ROM remains stable, while HAQ varies depending on the degree of disease activity.²² These questionnaires are complementary, to the extent that HAQ is influenced by the subject's adaptation to dysfunction over time, while EPM-ROM reflects the capacity of the movement itself.

Although the dysfunction due to pain and inflammation can be modified by clinical and rehabilitative approaches, this strategy may not be sufficient in the context of the sum of structural joint injuries, regardless of the surgical approach.²⁵ The best time for surgery indication in RA remains to be defined, being hampered by the availability of surgical services and the patient's motivation.^{7,11,25} We must add to this the fact that, even when indicated early, the surgery acts in an indirect manner in function improvement, i.e., through improvement of pain, rather than through regaining functional capacity.¹⁹ Few studies have evaluated the long-term effect of surgical interventions. Benoni et al. demonstrated improvement in pain in RA patients who underwent surgery of lower limb joints after one year of follow-up. The improvement in HAQ score of at least 0.2 occurred only in cases of knee and hip surgery, but not in ankle and feet surgery.²⁶ On the other hand, March et al. observed a reduction in HAQ only in patients undergoing knee arthroplasty, and stability in HAQ in those undergoing hip arthroplasty.¹⁹ Therefore, total HAQ does not reflect the potentially expected functional improvement after an orthopedic surgery in RA patients; and clinical practice shows that the modification of HAQ has value as a measure of the effect of other therapeutic modalities in RA.²⁷

In our study, we observed a positive correlation between the final score of the HAQ and its changes over the 3-year period, influenced by the subgroup of patients undergoing surgery. This finding highlights the deterioration of functional capacity in the group of operated patients, which is in agreement with other authors that the effect of arthroplasty in RA is more prominent in relieving pain than in the recovery of function.^{19,26,27} Considering that disease activity is a key

determinant factor to explain the loss of functional capacity, patients treated by rheumatologists have a more favorable progression of AR versus those treated by physicians from other specialties.¹²

Furthermore, we observed lower baseline HAQ scores in the surgery group compared to the conservatively treated group. No statistical analysis could be performed between the two groups, in view of the diversity in the group of patients operated and the small sample size. In four patients, more than one type of surgery was performed, and three patients underwent surgery both in their upper and lower limb. Two patients underwent ankle surgery which, according to Benoni et al., evolves unfavorably, with reduction of HAQ.²⁷ As for metacarpophalangeal arthroplasty, it is known that, although the patient demonstrates satisfaction with improved pinch and grip strength, the functional capacity shows modest gains.²⁸

Some of the limitations of this study reflect the deficiencies in tertiary care of Public Health Services in our midst. Among them, we can mention the difficulty in establishing the diagnosis of RA within the window of opportunity that would allow the preservation of joint function, as well as to getting the surgery needed in a timely manner. In our country, there are long waiting lines for treatment in the Public Health Service, and this can contribute to the deterioration of functional capacity to the point that, when finally the surgery is performed, the preservation of function is no longer possible. In this context, the heterogeneity with respect to disease duration and the small number of patients undergoing surgery are included.

This study was limited to a baseline evaluation and to another, after approximately three years of progression. The fulfillment of interim evaluations, and in particular a pre-operative assessment for the surgical group, could shed light on the worst course of operated patients. These patients may present a more aggressive disease, and perhaps their functional capacity was very poor at the time of surgery, justifying their unfavorable outcome.

Finally, patients taking biologic medications were not included in this study. It is not yet clear whether the biologicals are responsible for a reduction in surgical indications in RA patients.^{24,25,29} In general, it is known that the early use of DMARDs in RA tends to decrease the disease progression, improve quality of life and also reduce the costs of hospitalization, surgical procedures, and the long periods of rehabilitation.^{11,30}

Our data demonstrate that HAQ and EPM-ROM scores in a group of RA patients seen in the Public Health Service have not changed over an average 3-year period. The group of patients undergoing orthopedic surgery experienced worsening of functional capacity versus the group of patients who were not operated. This fact serves as a warning of the need to use broader therapeutic regimens and also of the need for the availability of musculoskeletal surgeries in a timely manner for RA patients.

Conflicts of interest

The authors declare no conflicts of interest.

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