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Original article

# The impact of comorbidities on the physical function in patients with rheumatoid arthritis

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ABSTRACT

*Objectives:* To investigate the association of comorbidities with mobility limitation and functional disability in patients with rheumatoid arthritis and to identify which comorbidity indicator is the most appropriate to determine this association.

*Methods:* Sixty rheumatoid arthritis patients were enrolled in a cross-sectional study for a period of 11 months. Comorbidities were assessed using three indicators: (i) the total number of comorbidities; (ii) the Charlson comorbidity index; and (iii) the functional comorbidity index. Disease activity was assessed using the Disease Activity Score 28. Functional capacity was measured using the Health Assessment Questionnaire, and mobility was measured using Timed Up and Go Test and Five-Times-Sit-to-Stand Test. Statistical analysis was performed using a stepwise log-linear multiple regression with a significance level of 5%.

*Results:* In the final model, only comorbidity was associated with mobility limitation. The functional comorbidity index score explained 19.1% of the variability of the Five-Times-Sit-to-Stand Test (coefficient of determination [$R^2$] = 0.191) and 19.5% of the Timed Up and Go Test variability ($R^2$ = 0.195). With regard to functional disability, the associated factors were comorbidity and disease activity, which together explained 32.9% of the variability of the Health Assessment Questionnaire score (adjusted $R^2$ = 0.329).

*Conclusion:* Comorbidities were associated with mobility limitation and functional disability in rheumatoid arthritis patients. The functional comorbidity index proved to be an appropriate comorbidity indicator to determine this association.



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## Influência das comorbidades na capacidade funcional de pacientes com artrite reumatoide

*Palavras-chave:*
Artrite reumatoide
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RESUMO

*Objetivos:* Investigar a associação das comorbidades com a limitação da mobilidade e com a incapacidade funcional em pacientes com artrite reumatoide, bem como identificar o indicador de comorbidade mais apropriado para determinar essa associação.

*Métodos:* Em um estudo transversal foram incluídos 60 pacientes com artrite reumatoide por um período de 11 meses. Comorbidades foram avaliadas por meio de três indicadores: (i) número total de comorbidades; (ii) índice de comorbidade de Charlson; e (iii) índice de comorbidade funcional. A atividade da doença foi avaliada pelo Índice de Atividade da Doença 28. A capacidade funcional foi mensurada pelo Questionário de Avaliação da Saúde, e a mobilidade foi mensurada pelos testes senta-levanta da cadeira cinco vezes e *timed get up and go*. A análise estatística foi realizada através de regressão múltipla log-linear Stepwise com nível de significância de 5%.

*Resultados:* No modelo final, apenas o fator comorbidades esteve associado à mobilidade. O escore no índice de comorbidade funcional explicou 19,1% da variabilidade do teste senta-levanta da cadeira cinco vezes (coeficiente de determinação [$R^2$] = 0,191) e 19,5% da variabilidade do *timed get up and go* ($R^2$ = 0,195). Em relação à incapacidade funcional, os fatores associados foram o fator comorbidades e a atividade da doença que em conjunto explicaram 32,9% da variabilidade do escore do Questionário de Avaliação da Saúde ($R^2$ ajustado = 0,329).

*Conclusão:* As comorbidades estão associadas com a limitação da mobilidade e a incapacidade funcional em pacientes com artrite reumatoide. O índice de comorbidade funcional demonstrou ser um indicador de comorbidade apropriado para determinar essa associação.



## Introduction

Rheumatoid arthritis (RA) is a chronic, progressive, systemic inflammatory disease which mainly affects the synovial membrane of joints, which may cause general impairment in functional status of patients.[1]

The study of functional disability and associated factors in RA is relevant, since the functional status is related to other clinical outcomes in this population, such as mortality,[2,3] loss of work capacity,[4,5] and use of health resources.[6,7]

There is increasing evidence pointing to the effect of the comorbidity factor in functional disability in patients with RA. Radner et al.[8,9] demonstrated the negative impact of comorbidities in all areas of functional capacity, regardless of the level of disease activity. Michaud et al.,[10] in a longitudinal study, showed that age over 65 years and presence of comorbidities were the main predictors of functional capacity loss in RA and that these factors not associated with the treatment of RA had the greatest effect in score progression, as measured by the Health Assessment Questionnaire (HAQ), in comparison with the effect of the treatment with biological agents.

The study of Norton et al.[11] showed a considerable prevalence of comorbidities at the time of diagnosis of RA and that it increases over the course of the disease. After a 15-year follow-up, 81% of RA patients presented comorbidities and, in addition, presence of comorbidities was associated with mortality and loss of functional capacity in these patients.[11] In an 11-year longitudinal study, Van den Hoek et al.[12] observed that somatic comorbidities and depression were associated with decreased functional capacity.

The published literature reveals that comorbidities are common conditions in this population, and on average each patient with RA has 1.6 comorbidities; and this number increases with age.[13,14] In this sense, there has been a growing interest from researchers in studying comorbidities and their impact on different clinical outcomes in RA, such as hospitalization, mortality, functional capacity and medical costs.[13–15]

Comorbidity is defined as a disease or medical condition that coexists with the disease of interest, identified, in this case as RA.[13] There are several ways to assess comorbidities.[13,15] The assessment of the impact of comorbidities in different clinical outcomes in patients with RA is usually performed through a simple counting of the number of existing comorbidities from a specific list established by researchers.[15] Using such an approach, each condition is equally scored, irrespective of its weight.[15]

Another way of measuring comorbidities involves the use of validated comorbidity indexes for predicting a certain clinical outcome.[13] Most of comorbidity indexes are designed to determine mortality, which is the case of Charlson comorbidity index (CCI)[16] and Kaplan–Feinstein index.[17] CCI has been developed by Charlson et al.,[16] and contains a list of 19 conditions, each of them having a weight according to its one-year risk of death. There is also a comorbidity index specifically developed to predict functionality, the functional comorbidity index (FCI).[18] FCI was developed by Groll et al.[18] using a North-American population affected mainly by orthopedic problems and that used the Quality of Life Questionnaire (SF-36) to quantify the subjects' functional capacity.

Studies pointing to an association between comorbidities and functional disability[8–12] evaluated the functionality