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Original article

Isokinetic assessment of ankles in patients with rheumatoid arthritis



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ABSTRACT

Introduction: The foot and ankle in rheumatoid arthritis undergo highly destructive synovitis with loss of muscle strength.

Objective: To evaluate the muscle strength of ankles in patients with rheumatoid arthritis based on isokinetic dynamometry parameters.

Materials and methods: Thirty patients with a diagnosis of rheumatoid arthritis involving the ankle(s) and 30 healthy subjects (control group) matched for age, gender, race, body mass index and lower limb dominance were studied. Dorsiflexion, plantar flexion, inversion and eversion were evaluated in all subjects on an isokinetic Cybex Norm dynamometer. The variables were compared between the rheumatoid arthritis and control groups and between the right and left ankles, and the dorsiflexor/plantar flexor and invertor/evertor muscle strength ratio was determined.

Results: Patients with rheumatoid arthritis performed statistically worse in the isokinetic dynamometry test for all ankle movements. The muscle strength ratio between dorsiflexors and plantar flexors was different in the two groups. No significant differences were observed in the invertor and evertor ratios. In the two groups the plantar flexor musculature was statistically stronger than dorsiflexors.

Conclusion: We conclude that patients with rheumatoid arthritis perform worse in isokinetic dynamometry regarding all ankle movements than control subjects, with similar isokinetic test results being observed for the right and left side in both groups, with few exceptions. Isokinetic evaluation posed no additional risk such as important pain or inflammatory activity to patients with rheumatoid arthritis.

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Avaliação isocinética do tornozelo de pacientes com artrite reumatoide

R E S U M O

Introdução: O pé e o tornozelo na artrite reumatoide passam por sinovite altamente destrutiva, com perda de força muscular.

Palavras-chave:

Tornozelo

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Avaliação isocinética
Pico de torque
Artrite reumatoide

Objetivo: Avaliar a força muscular do tornozelo de pacientes com artrite reumatoide com base em parâmetros da dinamometria isocinética.

Materiais e métodos: Foram estudados 30 pacientes com diagnóstico de artrite reumatoide. O estudo envolveu 30 indivíduos saudáveis (grupo controle) pareados por idade, sexo, etnia, índice de massa corporal e dominância de membro inferior. Todos os indivíduos foram submetidos a avaliação da flexão dorsal, flexão plantar, inversão e eversão com o dinamômetro isocinético Cybex Norm. As variáveis foram comparadas entre os grupos artrite reumatoide e controle e entre os tornozelos direito e esquerdo. Foi determinada a relação de força muscular flexores dorsais/flexores plantares e inversores/eversores.

Resultados: Os pacientes com artrite reumatoide tiveram resultados estatisticamente piores no teste de dinamometria isocinética para todos os movimentos do tornozelo. A relação de força muscular entre flexores dorsais e flexores plantares foi diferente nos dois grupos. Não foram observadas diferenças significativas na relação entre inversores e eversores. Nos dois grupos, os músculos flexores plantares eram estatisticamente mais fortes do que os flexores dorsais.

Conclusão: Os pacientes com artrite reumatoide têm pior desempenho na dinamometria isocinética em todos os movimentos do tornozelo do que os indivíduos do grupo controle. Foram observados resultados semelhantes no teste isocinético para o lado direito e esquerdo, em ambos os grupos, com poucas exceções. A avaliação isocinética não representou risco adicional, como dor importante ou atividade inflamatória, em pacientes com artrite reumatoide.

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Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory disease that particularly involves the synovial joints in a symmetric, generally progressive manner.^{1,2} The ankle complex and feet are commonly affected. In the latter case, the metatarsophalangeal joints are most frequently involved. Rheumatoid feet and ankles undergo episodes of highly destructive synovitis, which may lead to tendon rupture, subluxation, flatfoot, hallux valgus, etc. With the progression of RA, patients may experience limitations and disabilities in the activities of daily living, mainly due to pain, gait abnormalities and self-care difficulties.³

The exact quantification of muscle performance has always been a concern of health care professionals. During rehabilitation, the objective is to assess the patient and evaluate the effectiveness of therapeutic exercises designed to help the patient regain muscle strength. The isokinetic concept of exercise was developed by Perrin in 1960 and is used as an assessment method of muscle strength providing measurement to therapeutic effectiveness and it is also of help in recovering strength after injuries to the musculoskeletal system. One of the advantages of isokinetic exercise over other types is that it allows the assessment of the maximum muscle potential throughout the range of motion.⁴

RA causes muscle strength loss in patients stemming from joint inflammation, pain and edema as well as disuse and a loss of function.⁵⁻⁷

The aim of the present study was to assess ankle muscle strength in patients with RA using isokinetic dynamometry. The main isokinetic dynamometer parameters were correlated with overall functional capacity and, specifically, the functional capacity of the ankle and foot joints.

Materials and methods

Thirty patients with RA who fulfilled criteria of classification according to the American College of Rheumatology – ACR⁸ – and had involvement of the ankle(s) were included in the study. Patients were consecutively selected from the outpatient clinics of the Federal University of Sao Paulo (UNIFESP). Thirty adults with no lower limb disease, paired for gender, age, race, lower limb dominance and BMI with patients from the RA group, were selected to the control group.

Exclusion criteria were any other type of lower limb disease or injury, a history of joint surgery in the lower limbs, ankle infiltrations over the previous 3 months, pregnancy, heart disease, uncontrolled hypertension, coagulopathies, anticoagulant therapy, severe joint instability or fibromyalgia and inability to perform the complete test. The study was approved by the Ethics Committee of UNIFESP and all subjects signed a term of informed consent.

All patients were submitted to an isokinetic test on a Cybex Norm isokinetic dynamometer (Cybex International, Inc., Ronkonkoma, NY), which had been previously calibrated by a trained physiotherapist. The isokinetic test protocol followed the instructions suggested by Perrin.⁵ Before the test, a warm up for 5 min on an ergometric bicycle (Metabolic System Bike, Cybex – Division of Lumex, Ronkonkoma, NY) at a speed of 60 rpm was performed. The procedure was then explained to the patient, who practiced the movements to be tested at the same angular velocities in order to become familiar with the test. The sequence of movements was randomized for each subject. Both limbs were analyzed and the test was standardized to start with the right lower limb.

For the dorsiflexion/plantar flexion test, the subject was placed in the supine position on the bench, with the hip and knee flexed at 80° and 30°, respectively. The knee was

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