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Physical activity among patients from the Brasília cohort of early rheumatoid arthritis

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ABSTRACT

Introduction: The 2012 Consensus of the Brazilian Society of Rheumatology (SBR) for the treatment of Rheumatoid Arthritis (RA) recommends that patients should regularly perform physical exercises. There have been no studies in Brazil on physical activity among patients with early RA.

Objective: To investigate the physical activity practice among patients with early RA and the possible association between physical activity, disease activity and functional disability.

Methods: Cross-sectional study of patients from the Brasília cohort of early RA. Demographic data (sex, age and level of schooling), physical activity practice, Disease Activity Score 28 (DAS 28), functional disability (Health Assessment Questionnaire - HAQ), as well as data on smoking status, alcohol consumption, comorbidities and RA treatment were analyzed.

Results: A total of 72 patients were evaluated, 90.27% females, mean age 50.2 ± 13.3 years, mean DAS 28: 3.66 and HAQ: 0.69. Of them, 43.05% were regularly active, with walking being the most often practiced exercise (80.64%). The mean duration of exercise was 48.22 ± 27.18 min, with a frequency of 3.7 ± 1.64 times per week. There was no association between physical activity and gender, age, educational level, disease activity, functional disability, alcoholism or smoking, presence of comorbidities and treatment with drugs that alter the course of disease.

Conclusion: Given the importance of regular physical activity practice, it is necessary to recommend it to patients, especially resistance physical activities, which are not frequent among the patients in our study.

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Prática de atividade física entre pacientes da Coorte Brasília de artrite reumatoide inicial

R E S U M O

Palavras-chave:

Artrite reumatoide
Atividade física
Exercícios físicos
Sedentarismo

Introdução: O Consenso 2012 da Sociedade Brasileira de Reumatologia para Tratamento da Artrite Reumatoide (AR) recomenda que os pacientes realizem exercícios físicos de forma regular. Não há estudos no Brasil sobre a prática de atividade física entre pacientes com AR inicial.

Objetivo: Investigar a prática de atividade física entre pacientes com AR inicial e a possível relação entre atividade física, atividade da doença e incapacidade funcional.

Métodos: Estudo transversal incluindo pacientes da Coorte Brasília de AR inicial. Foram analisados dados demográficos (sexo, idade e escolaridade), prática de atividade física, índice de atividade da doença (Disease Activity Score 28 – DAS 28), incapacidade funcional (Health Assessment Questionnaire - HAQ), além de dados sobre tabagismo, etilismo, presença de comorbidades e tratamento da AR.

Resultados: Foram avaliados 72 pacientes, sendo 90,27% do sexo feminino, com média de idade de $50,2 \pm 13,3$ anos, média do DAS 28: 3,66 e a do HAQ: 0,69. Estavam regularmente ativos 43,05%, sendo que a caminhada foi o exercício mais praticado (80,64%). A média de tempo de exercício físico foi de $48,22 \pm 27,18$ min, periodicidade de $3,7 \pm 1,64$ vezes na semana. Não houve associação entre atividade física com sexo, idade, escolaridade, atividade da doença, incapacidade funcional, tabagismo ou etilismo, presença de comorbidades e tratamento com drogas modificadoras do curso da doença.

Conclusão: Dada a importância da prática regular de atividade física, há necessidade de orientação dos pacientes, em especial quanto à prática de atividades resistidas, pouco frequente entre os pacientes do nosso estudo.

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Introduction

Rheumatoid arthritis (RA) is a systemic, chronic and inflammatory disease, which mainly affects the synovium of peripheral joints, with great impact on quality of life, regarding the social, economic and psychological aspects.¹ The name early RA comprehends the first few weeks or months of joint symptoms or signs (usually less than 12 months), with the first twelve weeks of disease manifestations being the critical period.² In the last decade, in addition to the development of new drugs and therapeutic strategies,³ physical activity has become an important treatment component.⁴

Most dynamic exercise programs for patients with RA follows the recommendations of the American College of Sports Medicine (ACSM).⁵ It is recommended for healthy individuals, including patients with RA, to perform exercises lasting 20 minutes or more, at least twice a week, leading to a 60% increase of heart frequency expected for age, to achieve positive clinical effects without detriment to the disease, that is, without worsening RA activity and without causing pain.³ When comparing the dynamic exercise to the conventional joint rehabilitation program, there is an improvement in the quality of life of RA patients.^{6,7}

Aerobic activities such as, walking, jogging, cycling, water aerobics and swimming can improve cardiovascular fitness and help in the prevention of limitations related to RA.⁸

Among patients diagnosed with RA, according to Stenström et al., 20-30% have reduced aerobic capacity and consequent decrease in the rate of muscle strength and mass due to pain, fatigue and limited joint function caused by the disease.⁴ The

physical limitations shown by patients with RA can lead to a decrease in the practice of physical exercises and increased risk of cardiovascular events.⁹ Although the practice of physical activity is an important factor in the treatment of patients with RA, there have been no Brazilian studies on the prevalence of physical activity among patients with early RA.

The aim of the present study was to investigate the percentage of patients with early RA who practice some type of structured physical activity on a regular basis, as well as determine the type of physical activity most commonly practiced. The secondary objective was to evaluate the possible association between physical activity and demographic parameters (gender, age, level of education), disease activity, functional disability, clinical data (smoking status, alcohol consumption, comorbidities) and drug treatment of RA, including synthetic and biological disease-modifying anti-rheumatic drugs (DMARDs).

Patients and methods

Patients from the Brasilia cohort of RA were evaluated,^{10,11} which is an incident cohort of patients with early RA, followed in the Outpatient Rheumatology Clinic of Hospital Universitário de Brasília, Universidade de Brasília. For inclusion in this cohort, early RA is defined as the occurrence of joint symptoms compatible with pain and joint swelling with an inflammatory pattern, with or without morning stiffness or other manifestations suggestive of inflammatory joint disease, assessed by a single observer,^{12,13} lasting more than 6

weeks and less than 12 months, regardless of meeting the criteria of the American College of Rheumatology (ACR).¹⁴ All selected patients retrospectively met the EULAR / ACR criteria 2010.¹⁵

The patients received the standard treatment regimen used in the service, including synthetic or biological DMARDs, according to their needs. The study was carried out from March to May 2012, through direct interviews and medical file review. A structured questionnaire was applied to each patient to obtain information on gender, age, years of education, physical activity practice, index of disease activity (Disease Activity Score 28 - DAS28),¹⁶ Health Assessment Questionnaire (HAQ),¹⁷ lifestyle habits such as smoking or alcohol consumption, presence of comorbidities and drug treatment.

To identify the type of exercise, regularity and duration of physical activity, a questionnaire was adapted from that from the study by Valkeinen et al., which consists of three questions¹⁸:

- 1) Over the last six months, what kind of physical exercise do you regularly do during one week?
- 2) How often during the week do you perform this previously mentioned exercise?
- 3) What is the mean duration, in minutes, of a single session of exercise?

Patients consecutively selected in the cohort participated voluntarily in the study after explanations on the content of the research and after having signed an informed consent form. The study was approved by the Ethics Committee of the School of Medicine of Universidade de Brasília (CEP-FM 074/2005).

Descriptive statistical analysis was used to evaluate the general characteristics of the study population. Student's t test or Mann-Whitney test was used to analyze continuous variables. To evaluate the association between physical activity and educational level, smoking status, alcohol consumption, presence of comorbidities and treatment, the chi-square or Fisher's exact test were used when appropriate. The significance level was set at 5% ($P < 0.05$) for all statistical tests.

Results

From March to May 2012, 72 patients with early RA from the Brasília cohort were interviewed at HUB, of which 90.27% were females ($n = 65$). Mean age was 50.2 ± 13.3 years, mean follow-up (after the diagnosis of RA) was 4.2 ± 2.7 years, mean DAS28 was 3.66 and mean HAQ score was 0.69. The general characteristics of the study population regarding demographic data (gender, age and education), lifestyle habits such as smoking status, alcohol consumption and drug treatment are described in Table 1. Table 2 shows the comparative characteristics between the physically active and sedentary groups regarding disease activity, functional disability, comorbidities and drug treatment with synthetic and biological medications.

Of the total number of patients, 43.05% (31/72) were regularly active, according to the questionnaire response. Among patients who regularly performed physical exercises, 25 subjects (80.64%) walked, which was the most frequent physical

activity in this study. The practice of other forms of physical activity was less frequent, including Pilates (2/31-6.4%), water

Table 1 – General characteristics of patients with diagnosis of early RA (n = 72).

General characteristics	n (%) or mean \pm SD (n = 72)
Female sex	65 (90.27%)
Mean age (years)	50.2 \pm 13.3
Level of schooling	
Illiterate	3 (4.16%)
Elementary School	27 (37.5%)
High School	23 (31.9%)
Finished College/University	6 (8.33%)
Did not finish College/University	5 (6.94%)
Smoking	
Current smoker	8 (11.1%)
Ex-smoker	19 (26.3%)
Non-smoker	45 (62.5%)
Alcohol consumption	
Currently consumes alcohol	5 (6.9%)
Used to consume alcohol	3 (4.1%)
Non-consumer of alcohol	64 (88.8%)
Treatment with synthetic DMARDs	71 (98.6%)
Treatment with biological DMARDs	15 (20.8%)

RA, rheumatoid arthritis; DMARDs, disease-modifying anti-rheumatic drugs.

Table 2 – Comparative characteristics between groups of physically active and sedentary patients.

	Physical activity n = 31	Sedentary n = 41	P
DAS-28	3.51	3.78	0.32
HAQ	0.60	0.75	0.27
Comorbidities	14	19	0.88
SAH	1	4	0.38
Diabetes	15	10	0.062
Fibromyalgia	0	3	0.25
Osteoarthritis	1	4	0.38
Osteoporosis	7	10	0.91
Dyslipidemia	1	1	1.0
Sjögren's Syndrome	5	6	1.0
Depression	3	8	0.33
Anxiety	4	4	0.7
Hypothyroidism	0	1	1.0
Neoplasias			
Treatment with synthetic DMARDs	30	41	0.4
Methotrexate	24	34	0.77
Antimalarial drugs	8	9	0.9
Leflunomide	9	8	0.5
Sulfasalazine	3	5	1.0
Treatment with biological DMARDs	5	10	0.5
Infliximab	2	3	1.0
Etanercept	0	1	1.0
Adalimumab	1	3	0.6
Rituximab	2	1	0.5
Tocilizumab	0	0	-
Abatacept	0	2	0.5
Prednisone	6	9	0.9

SAH, systemic arterial hypertension; DMARDs, disease-modifying anti-rheumatic drugs.

aerobics (3/31- 9.6%) aerobics and weight lifting (1/31 - 3.22%), which were similar.

In the physically active group, the mean exercise duration was 48.22 ± 27.18 minutes, with a frequency of 3.7 ± 1.64 days/week. The mean age in the group that practiced physical exercises was 49.12 years, the mean DAS28 was 3.51 and the mean HAQ score was 0.60.

Among the sedentary individuals, the mean age was 51 years, mean DAS was 3.78 and mean HAQ score was 0.75.

There was no association between physical activity and demographic data (gender, age, social class and education), time of follow-up (after the diagnosis of RA), disease activity, functional disability and other lifestyle habits, such as smoking and drinking ($P > 0.05$). Similarly, there was no difference between the groups regarding the frequency of comorbidities, including those that could influence the practice of physical exercises, such as hypertension, diabetes mellitus, osteoarthritis and osteoporosis. However, there was a tendency to greater frequency of physical activity among patients with fibromyalgia (32% vs. 48%, $P = 0.06$). There was also no association between physical activity and drug therapy (synthetic and biological DMARDs).

Discussion

Physical activity can be considered a rehabilitation component in the treatment of early RA.^{3,4}

In our study, 43% of the patients from the Brasilia cohort of initial RA can be defined as physically active, with this percentage being higher than that observed in other studies involving patients with RA¹⁹ and even in epidemiological surveys carried out in the healthy population.^{20,21}

In an international study of patients diagnosed with RA carried out from January 2005 to April 2007 in 28 cities from 21 countries, with a total of 5235 patients, only 13.8% practiced physical activities more than three times a week.¹⁹ In this evaluation, according to Sokka et al., more than 80% of the individuals in seven countries and between 60% and 80% in other 12 countries did not practice regular physical activities, suggesting a high prevalence of sedentary individuals, differently from what we observed in our population.

The practice of physical activity among the patients from our cohort also appears to be higher than that reported in the healthy population. A sedentary life style was verified in an epidemiological survey of physical activity in the city of São Paulo, in which one thousand individuals were interviewed, and only 31.3% of respondents were engaged in some sort of physical activity.²⁰

Data from the Brazilian Institute of Geography and Statistics (IBGE) show that the practice of physical activity among Brazilians varies according to age range, demographic region and socioeconomic level of the population.²¹ In 2008, the contract between IBGE and the Ministry of Health, addressed by PNAD (National Household Sample Survey), conducted a supplemental health survey. This assessment consisted of 163 questions of several aspects, among which the practice of physical activity was assessed in individuals older than 14 years and in the following domains: commuting to work, work activity, cleaning the household and physical activity

during leisure. The number of individuals corresponded to 142,533,480. The prevalence of individuals classified as active during leisure time was exactly the same as those considered active during commuting, accounting for 10.5% of the population. Approximately one fifth of the population (20.2%) reported not practicing any type of physical activity at work, during leisure, commuting or at home.²¹

Although the methodology used in the IBGE survey was different than the one used in our study, the differences between the findings suggest that the population with early RA followed in our cohort is more physically active than the Brazilian population as a whole, a fact that is possibly due to repeated medical advice about the importance of physical exercise to reduce the disease morbidity and mortality.

The practice of physical activity in the Brasilia cohort of early RA was equally prevalent in both genders, similar to what was observed by Brodim et al., who also assessed patients with early RA.²² However, the international study in RA patients performed by Sokka et al.¹⁹ showed that the female gender was more associated with a sedentary life style. Considering the Brazilian population in general, the prevalence studies on physical activity in healthy subjects have shown that physical activity during leisure and commuting is more prevalent in males, according to IBGE data.²²

The mean age of patients from the Brasilia cohort that practiced physical activity was 49.2 years, slightly younger than the mean age in the study on established RA carried out by Sokka et al (mean age of 57 years)¹⁹ and the study on early RA performed by Brodin et al. (mean age of 55 years).²²

According to IBGE data, individuals with higher educational level tend to practice more physical activity, an observation that brings up a social and economic aspect, in which physical activity during leisure time is very often associated with private entities and higher social classes.²¹ In our study, we observed no association between physical activity and social class or educational level, which may have been due to the limited number of subjects evaluated, especially when we consider those belonging to the higher social strata in our sample.

According to the American Heart Association (AHA), it is recommended for healthy individuals between 18 and 65 years old, practicing at least 30 minutes of moderate physical activity at least five times a week or 20 minutes of more vigorous activity at least three times a week, or combination of both modalities.²³ The recommendations of the ACSM have been mentioned before and are indicated for the healthy population and for patients diagnosed with RA. In our study, in the physically active group, the mean time of physical exercise practice was 48.22 ± 27.18 minutes, at a frequency of 3.7 ± 1.64 days/week.

Among the patients from Brasilia cohort of early RA, the most often reported physical activity was walking, similar to data observed in the epidemiological survey performed by VIGITEL (Surveillance and Risk and Protective Factors for Chronic Diseases through Telephone Survey),²⁴ perhaps because this type of physical activity is practical and easy to perform. Walking is an aerobic activity that can provide physical and cardiovascular fitness;²⁵ however, in patients with RA and active inflammation in the joints of the lower limbs, or with comorbidities such as knee osteoarthritis, there may be

relative contraindications to its practice.²⁶ Thus, the practice of physical activity, including walking, should be targeted individually and according to each patient's level of physical fitness, disease activity and presence of comorbidities.²⁶

In our cohort we observed no significant association between physical exercises and disease activity (DAS-28) or functional disability (HAQ), a result similar to that of Brodim et al. in patients with early RA. However, Hakkinen et al.²⁷ observed a different outcome in a prospective randomized study in 62 patients with early RA.²⁷ In this study, patients were divided into two groups. One group performed strength training, focusing on all muscle groups, with 50% to 70% of maximum repetition or the other trained only to improve the range of motion, without increasing muscle strength, at a frequency of 2-3 times per week. There was a significant improvement in the DAS 28 and HAQ in the group submitted to an increase in muscle strength in comparison to the range-of-motion group.²⁷

According to Ende et al.,²⁸ the controlled, intense dynamic training is more effective in increasing aerobic capacity, joint mobility and muscle strength in patients with well-controlled RA; however, in the Brasília cohort of early RA, we found a low prevalence of resisted exercises, including weight lifting or any other activity of strength training, such as Pilates (only three patients). One hypothesis to explain this fact is the cost of practicing resisted exercises (usually performed in gyms and private studios or centers) and the absence of a formal rehabilitation program at the HUB, where patients could be advised on resisted exercises.

Generally, in RA, it is possible to attain aerobic fitness and improve muscle strength without any negative effects on pain intensity and disease activity.²⁹ Some studies have also observed an improvement in joint strength and mobility.³⁰

Our study showed no association between smoking habits and alcohol consumption with physical activity, but it is important to note that the prevalence of smoking and drinking in our cohort was considerably low.

Physical exercise is well indicated for patients with increased cardiovascular risk, such as hypertension and diabetes.³¹ In RA patients, and considering some of these comorbidities, physical activity becomes more important because cardiovascular risk may be even higher in this subgroup of patients. However, in our study, it was not observed that patients with comorbidities (such as hypertension and diabetes mellitus) practiced more physical activity.

Physical activity is also indicated in patients with other rheumatic diseases, such as osteoarthritis and osteoporosis, aiming, among other factors, muscle strengthening and joint protection.²⁶ On the other hand, these conditions can hinder the practice of physical exercises, as certain activities and modalities can cause joint pain in patients with osteoarthritis, and increase the risk of fractures in those with osteoporosis. In our study, we did not observe any influence of these conditions on physical activity performance in patients with early RA. The trend of higher frequency of physical activity among patients with fibromyalgia may be the result of encouragement given to these patients, as physical activities play an important role in the treatment of the disease.³²

Drug treatment in early RA is of great importance to control the inflammatory process in the joints, to reduce pain, in-

flammation and consequent deformities.³³ According to Reid et al., drug treatment in RA with biological agents, when associated with physical activity provides better quality of life for the patient.³³ In our study, no association was found between physical activity and drug treatment (synthetic and biological DMARDs), which might have been due to the small number of patients assessed.

Our study has some limitations: 1) this was a cross-sectional descriptive study, i.e., it does not allow us to hypothesize the cause and effect association; 2) the study was carried out in only one hospital, so the generalizability of our results to the general population of patients with early RA should be made with due caution. Despite the methodological limitations, however, this is the first study on physical activity among patients with early RA and the results observed can be used as basis for future studies and interventions in the area.

Conclusion

In the Brasília cohort of early RA, there was a higher prevalence of sedentary individuals than those who engaged in some kind of regular physical activity. However, when compared to international studies and data from the IBGE, the prevalence of physical activity in this study was considered high (43%) and walking was the most common physical activity. In this study, there was no association between physical exercises and disease activity and/or functional disability.

Considering the results obtained, we suggest that encouraging patients with early RA to regularly practice physical activities (including resisted activities) should be part of the routine care of the rheumatologist, within the limitations and peculiarities of each case, with the purpose of reducing cardiovascular morbidity and mortality and improving the quality of life of these patients.

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Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. da Mota LMH, Cruz BA, Brenol CV, Pereira IA, Rezende-Fronza LS, Bertolo MB, et al. Consenso 2011 da Sociedade Brasileira de Reumatologia para o diagnóstico e avaliação inicial da artrite reumatoide. *Rev Reumatol.* 2011;51(3):207-19.
2. da Mota LM, Laurindo IMM, Santos-Neto LL. Artrite reumatoide inicial-conceitos. *Rev Assoc Med Bras.* 2010;56(2):227-9.
3. da Mota LMH, Cruz BA, Brenol CV, Pereira IA, Rezende-Fronza LS, Bertolo MB, et al. Consenso 2012 da Sociedade Brasileira de Reumatologia para o tratamento da artrite reumatoide. *Rev Bras Reumatol.* 2012;52(2):135-74.

4. Stenström CH, Minor MA. Evidence for the benefit of aerobic and strengthening exercise in rheumatoid arthritis. *Arthritis Rheum.* 2003;49(3):428-34.
5. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. American College of Sports Medicine. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Med Sci Sport Exerc.* 2011;43(7):1334-59.
6. Baillet A, Payraud E, Niderprim V-A, Nissen MJ, Allenet B, François P, et al. A dynamic exercise program to improve patients disability in rheumatoid arthritis: a prospective randomized controlled trial. *Rheumatology.* 2009;48:410-5.
7. Munneke M, de Jong Z, Zwiderman 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):410-7.
8. Viet Vieland TPM. Rehabilitation of people with rheumatoid arthritis. *Best Pract Res Clin Rheumatol.* 2003;17:847-61.
9. Solomon DH, Curhan GC, Rimm EB, Cannuccio CC, Karlson EW. Cardiovascular risk factors in women with and without rheumatoid arthritis. *Arthritis Rheum.* 2004;59(12):3444-9.
10. da Mota LMH, Santos-Neto LL, Pereira IA, Burlingame R, Ménard HA, Laurindo IM. Autoantibodies in early rheumatoid arthritis: Brasília cohort: results of at three-year serial analysis. *Rev Bras Reumatol.* 2011;51(6):564-71.
11. da Mota LMH, dos Santos Neto LL, Burlingame R, Ménard HA, Laurindo IM. Laboratory characteristics of a cohort of patients with early rheumatoid arthritis. *Rev Bras Reumatol.* 2010;50(4):375-88.
12. da Mota LMH, Laurindo IM, dos Santos Neto LL. Prospective evaluation of the quality of life in a cohort of patients with early rheumatoid arthritis. *Rev Bras Reumatol.* 2010;50(3):249-61.
13. da Mota LMH, Laurindo IM, dos Santos Neto LL. Demographic and clinical characteristics of a cohort of patients with early rheumatoid arthritis. *Rev Bras Reumatol.* 2010;50(3):235-48.
14. Funovits J, Aletaha D, Bykerk V, Combe B, Dougados M, Emery P, et al. The 2010 American College of Rheumatology European League against arthritis: methodological report phase I. *Ann Rheum Dis.* 2010;69:1589-95.
15. Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham III CO, et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Ann Rheum Dis.* 2010;69:1580-8.
16. Pinheiro GDRC. Instrumentos de medidas da atividade da Artrite Reumatoide – Por que e como empregá-los? *Rev Bras Reumatol.* 2007;47(5):362-5.
17. Corbacho MI, Dapuerto JJ. Avaliação da capacidade funcional e da qualidade de vida de pacientes com artrite reumatoide. *Rev Bras Reumatol.* 2010;50(1):31-43.
18. Valkeinen H, Hakkinen A, Alen M, Hannonen P, Kukkonen-Harjula K, Hakkinen K. Physical fitness in postmenopausal women with fibromyalgia. *Int Journal Sports Med.* 2008;29(5):408-13.
19. Sokka T, Hakkinen A, Kautainen H, Maillefert JF, Toloza S, Hansen TM, et al. Physical inactivity in patients with rheumatoid arthritis: Data from twenty-one countries in a cross sectional international study. *Arthritis Rheum.* 2008;59(1):42-59.
20. Mello MT, Fernandez AC, Tukif S. Levantamento Epidemiológico da prática de atividade física na cidade de São Paulo. *Rev Bras Med Esporte.* 2000;6(4):119-24.
21. Knuth AG, Malta DC, Dumith SC, Pereira CA, Neto OLM, Temporão JG, et al. Prática de atividade física e sedentarismo em brasileiros: resultados da pesquisa nacional por amostra de domicílios (PNAD)-2008. *Ciência e Saúde Coletiva* 2011;16(9):3697-705.
22. Brodin N, Eurenus E, Jensen I, Nisell R, Opava CH. Coaching patients with early rheumatoid arthritis to healthy physical activity: a multicenter, randomized, controlled study. *Arthritis Rheum.* 2008;59(3):325-31.
23. Dumith SC. Atividade física no Brasil: uma revisão sistemática. *Cad Saúde Pública.* 2009;25(3):415-26.
24. Neto OLM, Monteiro CA, Castro AM, Cruz DKA. Padrão de atividade física em adultos brasileiros: resultados de um inquérito por entrevista telefônica, 2006. *Epidemiol Serv Saúde.* 2009;18(1):7-16.
25. Matsudo SM, Matsudo VKR, Neto TLB. Atividade física e envelhecimento: aspectos epidemiológicos. *Rev Bras Med.* 2003;60(3):133-6.
26. Biasoli MC, Izola LNT. Aspectos gerais da reabilitação física entre pacientes com osteoartrose. *Rev Bras Med* 2003; 60 (3): 133-36.
27. Hakkinen A, Sokka T, Kotaniemi A, Hannonen P. Randomized two-year study of the effects of dynamic strength training on muscle strength, disease activity, functional capacity, and bone mineral density in early rheumatoid arthritis. *Arthritis Rheum.* 2001;44(3):515-22.
28. Ende CHVD, Hazes JM, Cessie SL, Mulder WJ, Belfor DG, Breedveld FC, et al. Comparison of high and low intensity training in well controlled rheumatoid arthritis. Results of a randomized clinical trial. *Ann Rheum.* 2005;53(1):48-55.
29. Eurenus E, Stenstrom CH. Physical activity, physical fitness, and general health perception among individuals with rheumatoid arthritis. *Arthritis Rheum* 2005; 53 (1):48-55.
30. Hakkinen A, Sokka T, Kautiainen H, Kotaniemi A, Hannonen P. Sustained maintenance of exercise induced muscle strength and normal bone mineral density in patients with early rheumatoid arthritis: a 5 year follow up. *Ann Rheum Dis.* 2004;63:910-6.
31. Knuth AG, Bielemann RM, da Silva SG, Borges TT, Del Duca GF, Kremer MM, et al. Conhecimento de adultos sobre o papel da atividade física na prevenção e tratamento de diabetes e hipertensão: estudo de base populacional. *Cad Saúde Pública.* 2009;25(3):513-20.
32. Valim V. Benefícios dos exercícios físicos na fibromialgia. *Rev Bras Reumatol.* 2006;46(1):49-55.
33. Reid A, Brady A, Blake C, Mongey AB, Veale DJ, FitzGerald O, et al. Randomized controlled trial examining the effect of exercise in people with rheumatoid arthritis taking anti-TNF therapy medication. *BMC Musculoskelet Disord.* 2011;12(11):1-10.