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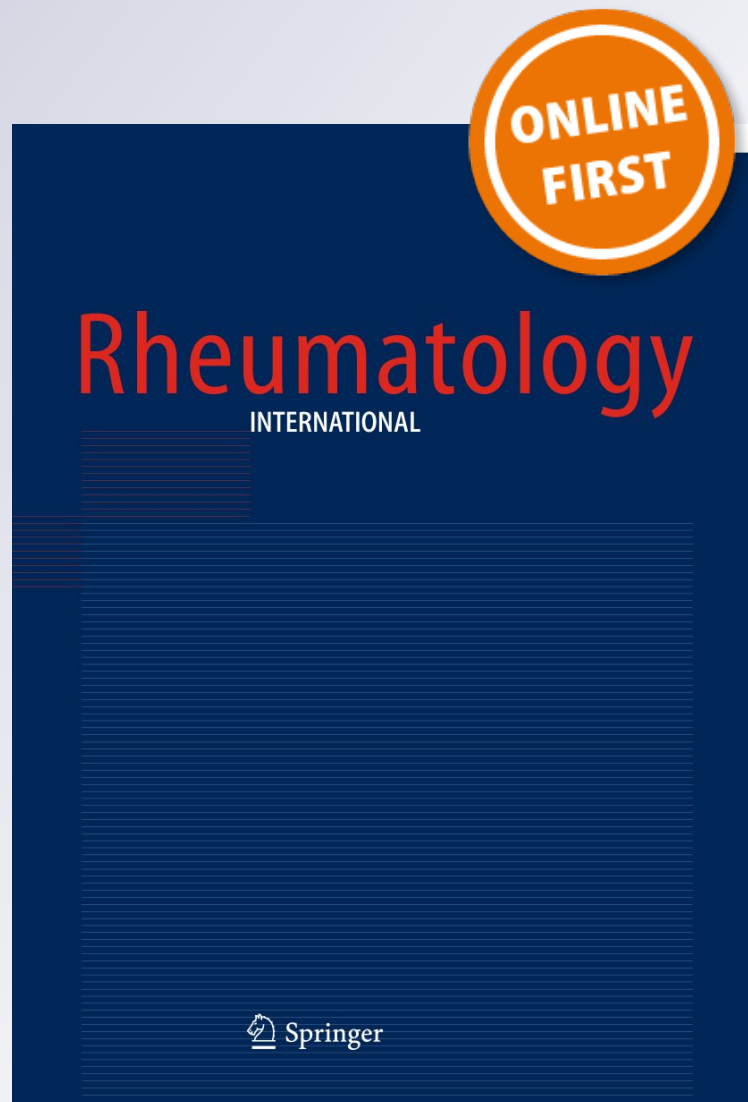
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Recognition and control of hypertension, diabetes, and dyslipidemia in patients with rheumatoid arthritis

Luísa Lima Castro[1] · Cristina Costa Duarte Lanna[1] · Mariana Pimenta Rocha[1] · Antônio Luiz Pinho Ribeiro[1] · Rosa Weiss Telles[1]

Abstract

Absolute cardiovascular risk of an individual with rheumatoid arthritis (RA) is greater when compared to the general population, and several factors have proven to be important for the development of coronary artery disease (CAD) in these patients, including factors related to the underlying disease, such as the systemic inflammatory response, drugs used in its treatment, and a higher prevalence of traditional risk factors for CAD. Our aim is to describe the recognition and control frequencies of systemic arterial hypertension (SAH), dyslipidemia, and diabetes mellitus (DM) in RA patients. Patients with RA answered a questionnaire focused on their general knowledge of the risk factors for CAD, as well as on the recognition of the risk factors that they possess. The patient's information, collected from a structured medical record, was reviewed to evaluate the control of risk factors. Hundred and thirty-four patients were included in the study. One patient was excluded due to the impossibility of reviewing her medical records. Therefore, 133 patients remained in the study. Patients had a mean (SD) age of 57.3 (12.9) years. SAH was diagnosed in 88 subjects, with a recognition frequency of 89.8%, and 63.3% had desirable blood pressure control. Seventy-two patients were diagnosed with dyslipidemia; 68.1% recognized that they had dyslipidemia and 69.4% achieved desirable LDL-c control. Twenty-two patients had DM; 90.9% admitted being diabetic and 40.9% had desirable glycemic control. The frequencies of the CAD risk factor recognition and control were high in comparison to those described for the general population.

Keywords Rheumatoid arthritis · Coronary artery disease · Risk factors for coronary artery disease · Cardiovascular risk factors

Introduction

Absolute cardiovascular risk of an individual with rheumatoid arthritis (RA) is high and equivalent to the risk level of the general population that is 5–10 years older. Furthermore, some studies have shown that patients with RA have a cardiovascular risk similar to that conferred by diabetes mellitus (DM) [1, 2].

Several factors have proven to be key to the development of coronary artery disease (CAD) in patients with RA, including factors related to the underlying disease, such as systemic inflammatory response, drugs used in its treatment, and a higher prevalence of traditional risk factors for CAD [3].

Patients' knowledge of their own risk for cardiovascular events is important to improve adherence to risk factor (RF) control strategies [4, 5]; however, to date, few studies have evaluated this recognition by RA patients. Interestingly

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enough, some studies have even documented that the RF for CAD has been poorly controlled in RA patients [6].

Methods

Patients

This is an observational cross-sectional study that included RA patients undergoing treatment at the Rheumatology Unit of the Hospital das Clínicas/Universidade Federal de Minas Gerais—Brazil (HC/UFMG). This study complies with Declaration of Helsinki and was approved by the Human Research Ethics Committee as well as by the Board of Education, Research, and Extension from the Hospital das Clínicas/UFMG (ETIC 274/08) on November 12, 2012, logged under protocol number: 06992112.7.0000.5149.

Inclusion criteria were female gender, over 18 years of age, and diagnosed with RA, according to the ACR/1987 or EULAR/ACR 2010 classification criteria [7]. All enrolled subjects signed a free and informed consent form. Exclusion criteria included cognitive impairment which precluded the understanding and answering of the questionnaire, and the impossibility of reviewing medical records for any reason.

Main outcome variable

Subjects were classified according to educational level and socioeconomic status based on the Brazilian Economic Classification 2015—Brazilian Institute of Geography and Statistics [8]. They were invited to answer a questionnaire, adapted from the CDC's National Center for Chronic Disease Prevention and Health Promotion [9]. Questions were related to patients' knowledge about (a) what factors would be RFs for CAD, (b) which of these RFs the patients believed they had, (c) RF management advice and treatments proposed by the physician, and (d) adherence to the proposed advice and treatments. To evaluate the patient's recognition of RF, they answered if they considered the factor to increase slightly, very much, or have no effect on the risk of developing CAD. The answers "increases greatly" and "increases slightly" were categorized as patient's recognition of the RF for CAD. The answers "does not increase" or "I do not know" were categorized as the absence of patient recognition. Patients who recognized they had a particular

RF answered questions about the advice they had received and their adherence to these recommendations. To access the medical advice received about systemic arterial hypertension (SAH), patients answered if they had been counseled by the physician to reduce their salt intake, to lose weight, or to practice exercises. Considering dyslipidemia, patients informed about the doctor's advice to reduce the intake of fat and cholesterol or to practice physical activity. For DM, patients were asked if they had received medical advice to lose weight, to reduce their sugar intake, or to practice physical activity.

After the questionnaire had been applied, patients' medical records, which were structured for clinical research, were reviewed to identify the diagnosis and control of SAH, dyslipidemia, and DM.

For the SAH diagnosis, we considered the use of antihypertensive drugs (as long as they were not only recommended for proteinuria control), systolic blood pressure (SBP) of greater than or equal to 140 mmHg, diastolic blood pressure (DBP) of greater than or equal to 90 mmHg, or the medical record of the diagnosis.

For the diagnosis of dyslipidemia, we considered the use of lipid-lowering drugs, or the measure of LDL cholesterol and triglycerides (TG) of greater than or equal to 160 mg/dL and 150 mg/dL, respectively, HDL cholesterol of lower than 50 mg/dL, or the diagnosis registered by the physician [10].

For DM diagnosis, this study considered the current use of oral hypoglycemic agents and/or insulin, glycated hemoglobin (HbA1c) of greater than or equal to 6.5%, fasting glycemia greater than or equal to 126 mg/dL, or the diagnosis recorded by the physician [11].

Hypertension, LDL cholesterol, and DM were classified as having desirable or ideal control, as can be seen in Table 1 [10–12].

Statistical analysis

The database was developed in EpiData® version 3.1 (EpiData Association, Odense, Denmark). For the statistical analysis, SPSS Statistics for Macintosh, Version 22.0 (IBM Corp. Armonk, NY, USA) was used.

Categorical variables were described as numbers and proportion (%), while the continuous variables were identified by their mean and standard deviation (SD) for the normal variables and the median and interquartile range (IIq) for the

Table 1 Criteria for the control of hypertension, dyslipidemia, and diabetes mellitus

	Systemic arterial hypertension	LDL-c	Diabetes mellitus
Desirable control	SBP ≤ 140 and DBP ≤ 90 mmhg	≤ 130 mg/dL	HbA1C ≤ 7%
Ideal control	SBP ≤ 130 and DBP ≤ 80 mmhg	≤ 100 mg/dL	HbA1C ≤ 6.5%

DBP diastolic blood pressure, *HbA1C* glycated hemoglobin, *LDL-c* LDL cholesterol, *SBP* systolic blood pressure

non-normal variables. This study performed a descriptive analysis of the proportions to evaluate patients' frequency of knowledge about RF for CAD, as well as to evaluate the patients' recognition and control of RFs.

Results

One hundred and thirty-four RA patients were included in the study. One patient was excluded due to the impossibility of reviewing her medical records. Therefore, 133 patients remained in the study. Patients had a mean (SD) age of 57.3 (12.9) years, the median (IIq) of disease follow-up time was 101 (46.75–166.75) months, and the mean (SD) age at diagnosis was 43.3 (14.7) years. The disease activity was assessed by the DAS28-erythrocyte sedimentation rate: mean (SD) 3.51 (0.18) and by DAS28-C-reactive protein: mean (SD) 3.07 (0.14). Fourteen patients presented overt cardiovascular disease: nine (6.7%) patients had heart failure, while 5 (3.8%) patients had previous myocardial infarction.

The socio-demographic characteristics are shown in Table 2. The frequency of clinical presentation and laboratory findings, as well as the clinical and treatment characteristics of RA, are shown in Table 3.

Table 2 Socio-demographic characteristics of patients with rheumatoid arthritis

	N (%) N = 133
Skin color	
Brown	61 (45.9)
White	36 (27.1)
Black	31 (23.3)
Yellow	5 (3.8)
Mean age in years (SD)	57.3 (12.9)
Education	
Incomplete middle school	85 (63.9)
Middle school	19 (14.3)
High school	27 (20.3)
University	1 (0.8)
Masters/doctorate	1 (0.8)
Socioeconomic class[a]	
D	33 (24.8)
C2	46 (34.6)
C1	37 (27.8)
B2	17 (12.8)
A2	0 (0)

RA rheumatoid arthritis, *SD* standard deviation

[a]Economic Classification in Brazil 2015—Brazilian Institute of Geography and Statistics. Class A = R$ 20,272.56 average household income. B2 = R$ 4427.36; C1 = R$ 2409.01; C2 = R$ 1446.24; D = R$ 639.78

Table 3 Clinical features upon diagnosis and current treatment of 133 rheumatoid arthritis patients

	N (%) (N = 133)
Joint involvement	
1 large joint	0 (0)
2–10 large joints	1 (0.8)
1–3 small joints	6 (4.5)
4–10 small joints	21 (15.8)
> 10 joints, at least 1 small	105 (78.9)
Serology	
Negative RF and anti-CCP	29 (21.8)
RF and/or anti-CCP in low titers (≤ 3× the upper limit of normality)	26 (19.5)
RF and/or anti-CCP in high titers (> 3× the upper limit of normality)	78 (58.6)
Synovitis duration	
< 6 weeks	2 (1.5)
≥ 6 weeks	131 (98.5)
Inflammatory activity	
Normal CRP and ESR	4 (3.0)
High CRP or ESR	129 (97.0)
Medications	
Current use of disease-modifying drugs	112 (84.2)
Current use of anti-malarial	10 (7.5)
Current use of prednisone	87 (65.4)
< 5 mg/day	18 (13.5)
5–20 mg/day	67 (50.4)
> 20 mg/day	2 (1.5)

Anti-CCP anti-citrullinated cyclic peptide, *RA* rheumatoid arthritis, *RF* rheumatoid factor, *CRP* C-reactive protein, *ESR* erythrocyte sedimentation rate

General recognition of risk factors for coronary artery disease

The recognition frequency of RF for CAD was high. The least recognizable RFs were DM, family history (FH), and the disease itself (RA) (Table 4).

Frequency of risk factors for coronary artery disease diagnosis, recognition, and control

The frequencies of the diagnosis, recognition, and control of RF for CAD are shown in Table 5. The number of patients with desirable control includes those with ideal control.

Discussion

The frequency of SAH and dyslipidemia among patients in our study was similar to the results reported by other authors in different countries in patients with RA [13, 14]. However,

Table 4 Frequency of risk factors of coronary artery disease recognition

Risk factor	Recognition N (%) ($N=133$)
RA	74 (55.6)
Systemic arterial hypertension	126 (94.7)
Dyslipidemia	121 (91.0)
Diabetes mellitus	83 (62.4)
Family history for CAD	106 (79.7)
Sedentary lifestyle	118 (88.7)
Smoking	121 (91.0)
Obesity	125 (94.0)

RA rheumatoid arthritis, *CAD* coronary artery disease

Table 5 Frequency of diagnosis, recognition, and control of systemic arterial hypertension, dyslipidemia, and diabetes mellitus

Risk factor	N (%)
Systemic arterial hypertension	
Frequency of diagnosis	88 (66.2)
Medication prescription	85 (96.6)
Recognition	79 (89.8)
Desirable control	56 (63.3)
Ideal control	15 (17.0)
Dyslipidemia	
Frequency of diagnosis	72 (54.1)
Medication prescription	56 (77.8)
Recognition	49 (68.1)
LDL desirable control	50 (69.4)
LDL ideal control	25 (34.7)
HDL control	40 (55.6)
TG control	41 (56.9)
Diabetes mellitus	
Frequency of diagnosis	22 (16,5)
Medication prescription	22 (100)
Recognition	20 (90,9)
Desirable control	9 (40,9)[a]
Ideal control	6 (27,3)[a]

RA rheumatoid arthritis, *HDL* high-density lipoprotein, *LDL* low-density lipoprotein, *TG* triglycerides

[a]One patient had no HbA1c result. Risk factors frequencies were calculated from total sample ($N = 133$). The recognition, medication prescription and control frequencies were calculated from the number of patients that presented each risk factor

lower frequencies of DM were described in other studies. Such a difference could be explained by the distinct criteria used to define the disease in the studies [15, 16].

The most frequently recognized RFs for CAD among patients were sedentary lifestyle, dyslipidemia, smoking, arterial hypertension, and obesity, while the least frequently

recognized RF was DM. A South Korean cross-sectional study (n = 200) showed that patients with RA were generally well aware of RF for CAD, although they underestimated their cardiovascular risk [17].

The lower recognition of DM as an RF could be explained by the lower frequency of this disease among the patients, when compared to the frequency of other RFs that were more commonly recognized. This could reduce the patients' knowledge about the disease. Regarding FH, one plausible hypothesis that could explain the low recognition could be the poor commitment of health professionals in informing the patient about this RF, since it is not modifiable.

Our results showed that the majority of patients recognized RA as an RF for CAD. Moreover, patients demonstrated a higher recognition frequency of being hypertensive, dyslipidemic, or diabetic, when compared to the general population. According to the literature, the recognition frequency of being hypertensive varies between 30 and 70% [18–20], of being dyslipidemic varies between 12 and 25% [21, 22], and of being diabetic varies between 70 and 80% [19, 23].

Regarding the management of RFs for CAD in RA patients, the treatment goal in our study was defined by considering the suggestion of most authors to use established therapeutic goals for high cardiovascular risk patients [24].

Some authors have reported that, among RA patients who had received a recommendation for lipid-lowering therapy, most had not been receiving medications [25, 26]. Chung et al. showed that only 40% of hypertensive RA patients had controlled blood pressure, and 57% had brought dyslipidemia and DM under control [6]. Another study demonstrated that among the 282 hypertensive RA individuals, only 21.6% had brought blood pressure under control [27]. In the present study, the control frequencies were higher for SAH (63.3%) and LDL-c (69.4%) and lower for DM (40.9%).

The frequency of SAH control among patients described in this study (63.3%) was high when compared to the general population, which ranges between 24 and 50% [20, 28–30]. McAllister et al. described a similar control rate (65.0%) in Canadian patients [31].

Regarding the general population, LDL-c control rates were lower (40–53%) [19, 32] than in the present study (69.4%). By contrast, for DM control, the results were similar to those found in the present study: Alkerwi et al. reported a control frequency of approximately 30%, considering HbA1c < 6.5% [23], while another group showed a control of 50%, considering HbA1c < 7% [19].

The high frequency of CAD RF recognition and control in our patients is possibly the result of a strong commitment of the medical assistant team to the prevention of negative cardiovascular outcomes in these patients. Several actions have been carried out for this purpose, such as community

outreach projects, research projects, creation and distribution of educational cards, and other actions. The majority of patients recognized their underlying disease (RA) as an RF and informed that they had received specific orientation for the control of a particular RF. This shows that patient education is systematized during appointments.

As limitations, we can say that, as this was a cross-sectional study, most of the data were obtained through a review of patient medical records, which can generate a bias caused by a loss of information. However, it should be emphasized that the medical records are structured for research, which reduces the probability of this type of bias.

In conclusion, the present study's results showed that most patients were aware that they had SAH, DM, or dyslipidemia, and this recognition frequency proved to be higher when compared to the general population. Moreover, the SAH and dyslipidemia control frequencies were higher than those described for the general population. This study also showed that patients recognized traditional RFs for CAD more often than they recognized their own disease as an RF.

Compliance with ethical standards

Conflict of interest Authors declare no conflicts of interest.

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