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Recognition and control of hypertension, diabetes, and dyslipidemia in patients with systemic lupus erythematosus

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Abstract

Systemic lupus erythematosus (SLE) patients have a high risk for cardiovascular events, but few studies have evaluated the recognition and none have evaluated the control of cardiovascular risk factors (RF) in SLE patients. The study aims to describe the recognition and control frequencies of systemic arterial hypertension (SAH), dyslipidemia, and diabetes mellitus (DM) in SLE patients. Of the female patients with SLE, 137 answered a questionnaire focused on general knowledge of the RF for coronary artery disease (CAD) and on recognition of the risk factors that they possess. The patient's information collected on a structured medical record was reviewed to evaluate the RF control. The mean age was 29.1 (9.6) years. Seventy patients had SAH; 85.7% recognized their condition and 71.4% had desirable blood pressure (BP) control ($< 140 \times 90$ mmHg). From a group of 63 patients with dyslipidemia, 68.3% recognized that they had dyslipidemia and 69.8% had desirable LDL-cholesterol (< 130 mg/dL). Sixteen patients had DM; 87.5% admitted being diabetic and 50.0% had desirable glycemic control (HbA1C $< 7\%$). Most patients were aware of presenting SAH, DM, or dyslipidemia, and the recognition frequency was higher in comparison to general population. The SAH and dyslipidemia control frequencies were higher than that described for the general population.

Keywords Diabetes · Dyslipidemia · Hypertension · Risk factors for coronary artery disease · Systemic lupus erythematosus

Introduction

Systemic lupus erythematosus (SLE) patients have a 5- to 6-fold increase in the risk of a cardiovascular event and a 50 times higher risk of acute myocardial infarction when compared to the general population of the same age (35 to 44 years) [1]. It has already been shown that SLE per se is an independent strong risk factor for cardiovascular disease [2].

Several factors have been shown to be important for the development of coronary artery disease (CAD) in patients with SLE. Among them, factors related to the underlying disease such as the systemic inflammatory response, drugs used in its treatment, and higher prevalence of traditional risk factors for CAD [1].

Patients' knowledge of their own risk for cardiovascular events is important to improve adherence to RF reduction and control strategies [3, 4], but, so far, few studies have evaluated the recognition of risk factors (RF) by SLE patients. Some authors have shown that these risk factors are often poorly addressed by physicians, with lack of orientation and prescription of medications for their control [5]. One study have documented that SLE patients have their hypertension and dyslipidemia poorly controlled [6].

Objectives

Our aim was to describe the recognition, medication prescription, and control frequencies of systemic arterial hypertension (SAH), dyslipidemia, and diabetes mellitus (DM) in SLE patients, and also to describe the recognition frequency of SLE as a risk factor for coronary artery disease (CAD).

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Patients and methods

This is an observational cross-sectional study that included SLE patients undergoing treatment at the Rheumatology Unit at the Hospital das Clínicas/Universidade Federal de Minas Gerais-Brazil (HC/UFMG). It was approved by the UFMG Research Ethics Committee (CAAE 06992112.7.0000.5149).

Inclusion criteria were female gender, aged over 18 years, and with SLE according to the classification criteria ACR 1982/97(REF) or SLICC 2012 [10, 11]. All enrolled subjects signed an informed consent. Exclusion criteria were cognitive impairment that precluded the understanding and answering of the questionnaire and impossibility of reviewing medical records for any reason.

Subjects were classified according to educational level and socioeconomic status based on the Brazilian Economic Classification 2015-Brazilian Institute of Geography and Statistics [7]. They were invited to answer a questionnaire, adapted from the CDC's National Center for Chronic Disease Prevention and Health Promotion [8]. Questions were related to patients' knowledge about (a) what were the RF for CAD recognized as so, (b) which of these RF patients thought they had, (c) RF management orientations and treatments proposed by physician, and (d) adherence to the proposed orientations and treatments. In order to evaluate patient's recognition of RF, they answered if they considered the factor to increase slightly, very much, or having no effect on the risk of developing CAD. The answers "increases greatly" and "increases slightly" were categorized as patient's recognition of a RF for CAD. The answers "does not increase "or "I do not know" were categorized as the absence of patient's recognition. Patients who recognized they had a particular RF, answered questions about orientations they received, and their adherence to them. To assess the orientations about SAH management, patients answered if they had been counseled by the physician to reduce salt intake, to lose weight, or to practice exercises. Considering dyslipidemia, patients informed about doctor's counseling to reduce the intake of fat and cholesterol or to practice physical activity. For DM, patients were asked if they had received counseling from the doctor to lose weight, to reduce the sugar intake, or to practice physical activity.

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

For the SAH diagnosis, we considered the use of antihypertensive drugs (as long as they were not indicated only for proteinuria control), or systolic BP (SBP) greater than or equal to 140 mmHg, or diastolic BP (DBP) 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 last measure of LDL-cholesterol and triglycerides (TG) greater than or equal to 160 and 150 mg/dL, respectively, or HDL cholesterol lower than 50 mg/dL, or the diagnosis registered by the physician [9].

For DM diagnosis, we considered the current use of oral hypoglycemic agents and/or insulin, or glycated hemoglobin (HbA1c) greater than or equal to 6.5%, or fasting glycemia greater than or equal to 126 mg/dL, or the diagnosis recorded by the physician [10].

Hypertension, LDL-cholesterol, and DM were classified as having desirable or ideal control according to Table 1 [9–11].

The database was developed in EpiData® version 3.1 (EpiData Association, Odense, Denmark). For the statistical analysis, SPSS Statistics for Macintosh, version 22.0, software (IBM Corp., Armonk, NY, 2013) was used.

Categorical variables were described as numbers and proportion (%), and the continuous variables by their mean and standard deviation (SD) for the normal variables and the median and interquartile range (IIq) for the non-normal variables. We performed descriptive analysis of proportions in order to evaluate patients' frequency of knowledge about RF for CAD and to evaluate recognition and control of the RF they had.

Results

A hundred-and-thirty-nine patients were included in the study. Two patients were excluded due to the impossibility of reviewing their medical records. Therefore, 137 patients remained in the study. The mean (SD) age was 41.5 (11.9) years, the median (IIq) of disease follow-up time was 113 (42–169) months, and the mean (SD) age at diagnosis was 29.1 (9.6) years. 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 SLE, are shown in Table 3.

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

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

DBP diastolic blood pressure, *HbA1C* glycated hemoglobin, *SBP* systolic blood pressure

Table 2 Socio-demographic characteristics of patients with systemic lupus erythematosus

	N (%), N = 137
Skin color	
Brown	77 (56.2)
White	33 (24.1)
Black	17 (12.4)
Yellow	10 (7.3)
Mean age in years (SD)	41.5 (11.9)
Education	
Incomplete middle school	50 (36.5)
Middle school	19 (13.9)
High school	61 (44.5)
University	4 (2.9)
Master's/doctorate	3 (2.2)
Socioeconomic class[a]	
D	24 (17.5)
C2	43 (31.4)
C1	48 (35.0)
B2	21 (15.3)
A2	1 (0.7)

SLE systemic lupus erythematosus, SD standard deviation

[a] Economic Classification Brazil 2015-Brazilian Institute of Geography and Statistics. Class A = 20.27256 average household income. B2 = 4.42736. C1 = 2.40901, C2 = 1.44624. D = 639.78

General recognition of risk factors for coronary artery disease

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

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

The frequencies of the diagnosis, drug prescription, recognition, and control of RF for CAD are shown in Table 5. The most frequent risk factors were SAH and dyslipidemia. Dyslipidemia was the comorbidity with the least frequency of drug prescription and the one that patients least recognized that they had. The desirable control of SHA and dyslipidemia were high, around 70%, but diabetes achieved a lesser degree of 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 SLE [12–15]. However,

Table 3 Accumulated clinical features and current treatment of 137 systemic lupus erythematosus patients

Clinical presentation	N (%)
Acute cutaneous lupus	98 (70.5)
Subacute cutaneous lupus	20 (14.6)
Chronic cutaneous lupus	59 (43.1)
Mucosal ulcer	55 (40.1)
Non-scarring alopecia	56 (40.9)
Arthritis	61 (44.2)
Arthralgia	75 (54.3)
Pleuritis	20 (14.5)
Pericarditis	13 (9.4)
Nephritis	76 (55.5)
Neurological	17 (12.4)
Laboratory findings	
Hemolytic anemia	44 (32.1)
Leukopenia or lymphopenia < 1000	103 (75.2)
Lymphopenia < 1500 on at least two occasions	113 (82.5)
Thrombocitopenia	26 (19.0)
Antinuclear antibodies (ANA)	134 (97.8)
Antibodies to double stranded DNA	68 (49.6)
Antibodies to Sm	43 (31.4)
Antiphospholipid antibodies	35 (25.5)
Low complement	99 (72.3)
Positive direct coombs[a]	9 (6.6)
Medications	
Current use of immunosuppressant	93 (67.9)
Current use of antimalarial	97 (70.8)
Current use of prednisone	105 (76.7)
< 5 mg/day	9 (6.6)
5–20 mg/day	86 (62.8)
> 20 mg/day	10 (7.3)

[a] Without hemolytic anemia

lower frequencies of DM were described in other studies [14, 16, 17]. Such difference could be explained by the distinct criteria used to define the disease in the studies.

The most frequently recognized RF for CAD among patients were sedentary lifestyle, dyslipidemia, smoking, arterial hypertension, and obesity, and the least frequently recognized was DM. Interestingly, for SLE patients, the recognition frequencies in the present study were higher than in the literature. Costenbader et al., studying 110 SLE patients, found that obesity as RF was identified by 89% patients, smoking by 81%, hypercholesterolemia by 80%, hypertension by 78%, and only 51% identified DM [16]. Petri et al. described in 225 SLE patients the recognition of DM as RF for CAD by only 27% of them [18]. This higher frequency of recognition in our study cannot be explained by different educational levels, since more than half of our participants had less than high

Table 4 Recognition frequency of risk factors for coronary artery disease

Risk factor	Recognition N (%), N = 137
SLE	81 (59.1)
Systemic arterial hypertension	136 (99.3)
Dyslipidemia	128 (93.4)
Diabetes mellitus	93 (67.9)
Family history for CAD	105 (76.6)
Sedentary lifestyle	125 (91.2)
Smoking	129 (94.2)
Obesity	134 (97.8)

SLE systemic lupus erythematosus, *CAD* coronary artery disease

school level, whereas in these others studies, most of the subjects had high school level completed.

The lower recognition of DM as RF could be explained by the lower frequency of this disease among the patients, when compared to the frequency of other RF that were more 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 the health professionals in informing about this RF since it is not modifiable.

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

Systemic arterial hypertension	N (%), N = 137
Frequency	70 (51.1)
Medication prescription	66 (94.3)
Recognition	60 (85.7)
Desirable control	50 (71.4)
Ideal control	17 (24.3)
Dyslipidemia	
Frequency	63 (46.0)
Medication prescription	43 (68.3)
Recognition	43 (68.3)
LDL	
Desirable control	44 (69.8)
Ideal control	33 (52.4)
HDL control	19 (30.2)
TG control	35 (55.6)
Diabetes mellitus	
Frequency	16 (11.7)
Medication prescription	14 (87.5)
Recognition	14 (87.5)
Desirable control	8 (50.0)
Ideal control	6 (37.5)

HDL high-density lipoprotein, *LDL* low-density lipoprotein, *SLE* systemic lupus erythematosus, *TG* triglycerides

Our results showed that the majority of SLE patients recognized their disease as RF for CAD, a rate higher than described by other authors [13, 18]. Besides that, patients demonstrated a higher recognition frequency of being hypertensive, dyslipidemic, or diabetic, compared to the general population. According to the literature, the recognition frequency of being hypertensive varies between 30 and 70% [19–21], of being dyslipidemic varies between 12 and 25% [22, 23], and of being diabetic between 70 and 80% [20, 24].

Regarding the management of RF for CAD in patients, the treatment goal in our study was defined, considering the suggestion of most authors to use established therapeutic goals for high cardiovascular risk patients [25].

We did not find studies that analyzed therapeutic goals achieved in the treatment of SHA, dyslipidemia, or DM in SLE individuals, but some authors, studying a new score for calculate cardiovascular risk in SLE patients, reported that among 49 participants deemed high risk by these scores, only 55 and 10% met targets for blood pressure and cholesterol, respectively [6]. According to literature, it seems that dyslipidemia tends to be poorly treated, with few dyslipidemic patients receiving lipid-lowering agents [26] and orientations for dyslipidemia control [18]. In contrast, in the present study, the majority of SLE patients with SAH, dyslipidemia, or DM had been treated with medications and reported having been advised by physicians about measures to control these RFs.

The frequency of SAH control described in this study (71.4%) was high when compared to the general population, which ranges between 24 and 50% [21, 27–30].

Regarding the general population, LDL-c control rates are lower (40 to 53%) [20, 31] than in the present study (69.8%). In contrast, for DM control, the results were similar to those found in the present study. Alkerwi et al. reported a control frequency of about 30%, considering HbA1c < 6.5% [24], and another group showed control of 50%, considering HbA1c < 7% [20].

The high frequency of CAD RF recognition and control in our patients is possibly the result of a strong commitment of the 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 with SLE recognized their underlying disease as 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 this is a cross-sectional study, besides most of the data was obtained by medical record review, which can generate loss of information bias. However, it should be emphasized that the medical records are structured for research, which reduces the probability of this bias occurrence. Another limitation is that the questionnaire applied was

adapted for Brazilian-Portuguese, but was not validated. However, the adapted questions were very simple and direct, with use of basic current Portuguese medical terms, and we therefore believe that it fulfills its purpose.

In conclusion, our results showed that most patients were aware of presenting SAH, DM, or dyslipidemia, and the recognition frequency was higher in comparison to general population. The SAH and dyslipidemia control frequencies were higher than that described for the general population. We observed that many patients recognized SLE as a RF for CAD, but they recognized the traditional ones more often than their disease itself. We hope that our study will stimulate health professionals to control RF for CAD in SLE patients.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Compliance with ethical standards

Disclosures None.

Ethical approval This study was approved by the UFMG Research Ethics Committee (CAAE 06992112.7.0000.5149) and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All enrolled subjects signed an informed consent prior to their inclusion in the study.

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