

Patient Perception of Cardiovascular Risk in Rheumatoid Arthritis

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Objective. Patients with rheumatoid arthritis (RA) have higher incidence of cardiovascular diseases (CVDs) compared with age- and sex-matched controls. The objective of our study was to measure the knowledge of patients with RA about the association between their disease and cardiovascular (CV) risk and to measure the frequency of counseling by physicians based on patient report.

Methods. A telephone survey was conducted among patients with RA enrolled in the Consortium of Rheumatology Researchers of North America RA registry to collect data on medical and social history and on knowledge about CVD risk in RA and how they learned about that risk. Multivariable logistic regression models were performed to determine the factors associated with patients' knowledge and factors influencing likelihood of physician counseling. The odds ratios (ORs) represent adjusted multivariable results.

Results. Of 185 patients with RA included in the study, 87 patients (47%) were aware that RA was a CV risk factor. Older age (OR 0.6; 95% confidence interval [CI] 0.4-0.8 per decade) and smoking (OR 0.4; 95% CI 0.1-0.9) were associated with low awareness, whereas disease duration of more than 10 years (OR 5.2; 95% CI 2.2-12.1) was positively associated with patient knowledge. Counseling by physicians, mostly rheumatologists, on CV risk in RA was reported by 47 patients (25%). Disease duration of more than 10 years (OR 3.9; 95% CI 1.2-13.1) was positively associated with patient-reported counseling. Patients with hypertension were less likely to report counseling (OR 0.4; 95% CI 0.2-0.9).

Conclusion. Our study demonstrated low patient awareness of CV risk with RA and low rates of patient-reported counseling by physicians. This is an unmet need in clinical practice, which may be overcome by multimodal approaches such as developing websites, organizing symposiums, and involving health care providers at various levels.

INTRODUCTION

Patients with rheumatoid arthritis (RA) have a higher incidence of cardiovascular diseases (CVDs) than the general population does (1,2), which is attributable to multiple disease-specific and traditional cardiovascular (CV) risk factors (3,4). Despite improvement in the management of RA with various disease-modifying agents (such as disease-modifying antirheumatic drugs [DMARDs]), early CVD-related morbidity and mortality remain major problems (2). There are published guidelines for monitoring for CVD in RA (5).

Appropriate treatment of RA is an important component of CV risk reduction (6). Studies have also shown improvement in CV health with management of traditional risk factors (4). However, CV risk monitoring is often inadequate in subjects with RA (7).

Informing patients of the risk of CVD in RA is an important part of effective management, but data on CV risk counseling are limited. Most data come from studies examining the frequency of documentation on CV risk counseling, which may not adequately reflect how often counseling occurs and cannot evaluate whether patients have heard and understood this counseling (8,9).

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SIGNIFICANCE & INNOVATIONS

- Our study demonstrated a low level of patient awareness and infrequent patient-reported counseling by health care providers about the risk of cardiovascular diseases (CVDs) associated with rheumatoid arthritis (RA).
- Longer disease duration is associated with increasing awareness of cardiovascular (CV) risk in patients with RA and a higher likelihood of counseling by health care providers.
- Older age and smoking are associated with less awareness of CV risk in patients with RA.
- Our findings illustrate gaps in patient understanding about the association of RA with CVD.

The objective of our study was to directly measure the knowledge of patients with RA about the association between their disease and CV risk and to identify factors associated with this knowledge. We also studied the frequency of counseling by health care providers based on patient reports from one-on-one telephone interviews.

PATIENTS AND METHODS

We identified patients with RA enrolled in the Consortium of Rheumatology Researchers of North America (Corrona) RA registry at our practice location, which is a rheumatology private practice group consisting of 11 providers who are aged between 35 and 70 years. Patients with at least one office visit between January 1, 2017, and December 31, 2018, were included in this study. We had prior consent from patients to be contacted for any RA-related research.

A questionnaire was developed to collect data on relevant medical and social history and on knowledge about the association between RA and CVD and how they learned about it (Supplementary Table 1).

Patients were contacted by our team members by telephone. Objectives of the research project were explained, and verbal informed consent was obtained. The survey was completed by telephone in 10 to 15 minutes.

Descriptive statistics were used to summarize the demographic data, pertinent medical and social history, and overall knowledge about CVD. Univariate and multivariable logistic regression models with backward selection (sequentially removing variables with $P > 0.2$, except for age and sex) were used to determine the association between patients' knowledge of RA as a CV risk factor and independent variables of age; sex; body mass index (BMI); education; newspaper reading; tobacco use; exercise habits; RA duration; most recent flare; comorbidities, including CVD, diabetes mellitus (DM), hypertension (HTN), and hyperlipidemia (HL); and family history of CVD, DM, HTN, and HL. We used similar statistical models to determine the factors

influencing the likelihood of physician counseling regarding CV risk in RA based on patient report. CVD was defined as a history of coronary artery disease and/or cerebrovascular accidents and/or peripheral arterial diseases. Patients were asked about prior history of angina, heart attack, cardiac stenting, coronary artery bypass grafting, stroke, transient ischemic attack, peripheral vascular disease, and stenting in peripheral arteries for gathering information about CVD. Information about other comorbidities was obtained from the patients by asking them about the specific diseases mentioned above.

RESULTS

We identified 565 patients with RA enrolled in the Corrona RA registry at our practice location in the defined study period. Each patient was contacted by our study team members at least once by telephone. Of 236 (42%) patients who were reachable by phone, 190 patients (34% of the total cohort and 80% of the patients reachable on phone) participated, 43 patients (3% of total cohort and 8% of the patients reachable on phone) refused to participate, two patients had died, and one patient was in the hospital. There were multiple missing data in five subjects, who were excluded from the analysis, leaving 185 participants (33% of the

Table 1. Sociodemographic characteristics and medical history

| Patient Characteristics | Results |
|--|------------------|
| Age, mean (range), y | 65.4 (29-88) |
| Ethnicity (white), n (%) | 160 (93.0) |
| Female sex, n (%) | 133 (72.0) |
| BMI, mean (range) | 29.3 (18.0-49.0) |
| Education (bachelor's degree or higher), n (%) | 81 (44.0) |
| Retired, n (%) | 75 (40.5) |
| Disabled, n (%) | 12 (6.4) |
| Reads news blog/newspaper, n (%) | 121 (65.4) |
| Current tobacco use, n (%) | 28 (15.0) |
| Exercise (at least once/wk), n (%) | 122 (66.0) |
| RA duration, n (%) | |
| >10 y | 136 (73.5) |
| 5-10 y | 28 (15.0) |
| <5 y | 21 (11.0) |
| cDMARD use, n (%) | 95 (62.1) |
| bDMARD use, n (%) | 106 (69.3) |
| CVDs, n (%) | 34 (18.0) |
| Antiplatelet agent/anticoagulant use, n (%) | 69 (37.3) |
| DM, n (%) | 26 (14.0) |
| Hypoglycemic drug use, n (%) | 24 (13.0) |
| HTN, n (%) | 102 (55.0) |
| Antihypertensive use, n (%) | 111 (60) |
| HL, n (%) | 76 (41.0) |
| Statin and/or fish oil use, n (%) | 101 (54.6) |
| FH of CVD, n (%) | 116 (62.7) |
| FH of DM, n (%) | 78 (42.2) |
| FH of HTN, n (%) | 117 (63.2) |
| FH of HL, n (%) | 61 (33) |

Abbreviation: bDMARD, biologic disease-modifying antirheumatic drug; BMI, body mass index; cDMARD, conventional disease-modifying antirheumatic drug; CVD, cardiovascular disease; DM, diabetes mellitus; FH, family history; HL, hyperlipidemia; HTN, hypertension; RA, rheumatoid arthritis.

total cohort). Patients who did not participate ($n = 380$; 67% of the total cohort) were mostly women ($n = 297$; 78%) with average age of 63.5 (range 24-98 years), similar to the participating cohort.

Patient characteristics and relevant medical and social history are summarized in Table 1. In the study group, 160 participants (93%) were white, 133 participants (72%) were women, and the average age was 65.4 years (range 29-88). Among the patients with available BMI data (71 of 167) 43% had obesity. The majority of patients (74%) had long-standing RA for at least 10 years, and almost all (97%) were on a DMARD. Many patients (41%) were doing well, without a flare within the past year.

Factors influencing patient awareness of RA as a CV risk factor. Overall, 87 patients (47%) were aware that RA was a CV risk factor. In a multivariable model, patients who were older (odds ratio [OR] 0.6; 95% confidence interval [CI] 0.4-0.8 per decade) and who smoked (OR 0.4; 95% CI 0.1-0.9) were less likely to be aware of CV risk with RA, whereas patients with a disease duration of more than 10 years (OR 5.2; 95% CI 2.2-12.1) were more likely to be aware of the risk (Table 2).

Factors influencing likelihood of counseling by rheumatologists regarding CV risk in RA. Only 47 patients (25%) reported that a physician had discussed CV risk in RA, and this physician was most commonly their rheumatologist ($n = 39$; 83%). Many patients ($n = 56$; 30%) had read about the risk of CVD with RA from online resources.

In a multivariable model, we again found that disease duration of more than 10 years (OR 3.9; 95% CI 1.2-13.1) was positively associated with the likelihood of patients reporting counseling by rheumatologists. Patients with HTN were less likely to report counseling (OR 0.4; 95% CI 0.2-0.9) (Table 3).

DISCUSSION

Patients with RA have a 1.5 to 2 times higher risk of CVD compared with an age- and sex-matched population (5). In our cohort, more than half of the patients were unaware of the association between RA and high CV risk, and only 25% recalled having this discussion with their physicians, who were mostly rheumatologists. Understanding and frequency of counseling were particularly low in older patients and those with shorter disease duration. Although some patients may not have remembered counseling that they received, our numbers are meaningful in that they reflect counseling that led to improved patient understanding. Many patients also learned about CV risk in RA from online resources. Given that CV risk reduction and lifestyle modification requires patient education, counseling about risk factors, and behavioral acceptance with understanding of the information (10), these results reveal an important gap in clinical practice.

Few studies reported on patient awareness of the higher CV risk associated with the diagnosis of RA (9,11-13). Some reports were based on extensive in-person interviews of a few patient volunteers (11,12). Similar to the results of our study, knowledge of RA

Table 2. Factors associated with patients' awareness of RA as a cardiovascular risk factor

| Independent Variables | Univariate ^a | | | Multivariate ^b | | |
|---|-------------------------|----------------|-----------------|---------------------------|-----------------|-----------------|
| | OR | 95% CI | P | OR | 95% CI | P |
| Age per 10 y | 0.8 | 0.6-1 | 0.08 | 0.6 | 0.4-0.8 | <0.01 |
| Sex (female vs. male) | 1.8 | 0.9-3.5 | 0.08 | 1.7 | 0.8-3.5 | 0.16 |
| Reads newspaper | 1.5 | 0.8-2.7 | 0.2 | 1.8 | 0.9-3.6 | 0.08 |
| RA duration (>10 y vs. <10 y) | 3.3 | 1.6-6.8 | <0.01 | 5.2 | 2.2-12.1 | 0 |
| Tobacco use | 0.5 | 0.2-1.1 | 0.09 | 0.4 | 0.1-0.9 | 0.04 |
| Exercise | 1.6 | 0.8-2.9 | 0.15 | 1.7 | 0.8-3.4 | 0.14 |
| BMI | 0.9 | 0.9-1 | 0.31 | ... | ... | ... |
| Education (bachelor's degree or higher vs. less than bachelor's degree) | 0.5 | 0.3-0.9 | 0.04 | ... | ... | ... |
| Last RA flare (reference: >1 y/cannot remember) | | | | | | |
| Within 3-12 mo | 0.8 | 0.4-1.8 | 0.6 | ... | ... | ... |
| <3 mo ago | 1.1 | 0.5-2.3 | 0.8 | ... | ... | ... |
| CVDs | | | | | | |
| DM | 1.1 | 0.5-2.6 | 0.74 | ... | ... | ... |
| HTN | 0.8 | 0.4-1.4 | 0.38 | ... | ... | ... |
| HL | 0.7 | 0.4-1.3 | 0.26 | ... | ... | ... |
| FH of CVD | 1.4 | 0.8-2.5 | 0.29 | ... | ... | ... |
| FH of DM/HTN/HL | 1.6 | 0.8-3.4 | 0.18 | ... | ... | ... |

Abbreviation: BMI, body mass index; CI, confidence interval; CVD, cardiovascular disease; DM, diabetes mellitus; FH, family history; HL, hyperlipidemia; HTN, hypertension; OR, odds ratio; RA, rheumatoid arthritis.

^aThe univariate analysis includes all potential factors included in the study.

^bThe multivariate model uses backward selection, keeps all the factors with a P value <0.2, and forces in age and sex.

Older age, shorter duration of RA and use of tobacco were significantly associated with less awareness of RA as a cardiovascular risk factor (in bold).

Table 3. Factors associated with likelihood of counseling by rheumatologists regarding cardiovascular risk in RA

| Independent Variables | Univariate ^a | | | Multivariate ^b | | |
|---|-------------------------|----------|----------|---------------------------|----------|----------|
| | OR | 95% CI | <i>P</i> | OR | 95% CI | <i>P</i> |
| Age per 10 y | 0.9 | 0.7-1.4 | 0.96 | 0.8 | 0.6-1.2 | 0.39 |
| Sex (female vs. male) | 1.7 | 0.7-3.9 | 0.24 | 1.6 | 0.6-4.1 | 0.28 |
| RA duration (<10 years vs. >10 years) | 3.9 | 1.3-11.6 | 0.015 | 3.9 | 1.2-13.1 | 0.02 |
| CVDs | 1.8 | 0.7-4.1 | 0.19 | 2 | 0.8-5.2 | 0.14 |
| HTN | 0.5 | 0.2-0.9 | 0.05 | 0.4 | 0.2-0.9 | 0.03 |
| Tobacco use | 0.4 | 0.1-1.4 | 0.16 | 0.4 | 0.1-1.3 | 0.13 |
| BMI | 0.9 | 0.9-1.1 | 0.94 | ... | ... | ... |
| Education (bachelor's degree or higher vs. less than bachelor's degree) | 0.7 | 0.3-1.4 | 0.29 | ... | ... | ... |
| Reads newspaper | 0.7 | 0.3-1.4 | 0.34 | ... | ... | ... |
| Last RA flare (reference: >1 y/cannot remember) | | | | | | |
| Within 3-12 mo | 1.2 | 0.5-2.9 | 0.74 | ... | ... | ... |
| <3 mo ago | 0.9 | 0.4-2.4 | 0.98 | ... | ... | ... |
| DM | 0.9 | 0.3-2.5 | 0.8 | ... | ... | ... |
| HL | 0.6 | 0.2-1.2 | 0.14 | ... | ... | ... |
| FH of CVD | 0.9 | 0.4-1.9 | 0.87 | ... | ... | ... |
| FH of DM/HTN/HL | 0.6 | 0.3-1.4 | 0.26 | ... | ... | ... |
| Exercise | 1.4 | 0.6-3.1 | 0.39 | ... | ... | ... |

Abbreviation: BMI, body mass index; CI, confidence interval; CVD, cardiovascular disease; DM, diabetes mellitus; FH, family history; HL, hyperlipidemia; HTN, hypertension; OR, odds ratio; RA, rheumatoid arthritis.

^aThe univariate analysis includes all the potential factors included.

^bThe multivariate model uses backward selection, keeps all the factors with a *P* value <0.2, and forces in age and sex.

as a CV risk factor was reportedly low (less than 50%) in patients and decreased with increasing age (13). Bartels et al reported low frequency of physician counseling, which was similar to our findings (11). They interviewed 15 patients with RA, and almost half of them read about the high CVD risk with RA from external sources, and some learned of it from their rheumatologists (11). Similarly, a retrospective chart review of 170 patients with RA at an academic rheumatology practice revealed almost no documentation regarding formal CV risk assessment or communication to primary care physicians regarding higher CV risk with RA diagnosis (8).

Our cohort demonstrated that longer duration of RA was positively associated with likelihood of counseling. This is not unexpected because with multiple visits and better control of RA over time, physicians would have a greater opportunity to discuss CV health. A small number of patients interviewed at a nurse-led CV screening program revealed that they preferred discussing the treatment of RA before focusing on CV risk management (12). In another study, rheumatologists, primary care physicians, and a small number of patients with RA reported that acuity and complexity of RA management decisions often take precedence over preventive health care during office visits (11). Because early management of CV risk factors may help prevent later events, increased attention to counseling on CV risk in RA represents an opportunity for improved patient care. It may also be helpful to connect adequate disease control with a possibly diminished risk for CVD (5). Because some patients may be reluctant to accept a treat-to-target approach (14), the inclusion of the additional possible beneficial effects of disease control on the patient's risk of heart disease may present a more compelling and

understandable case for acceptance of a more aggressive treatment approach in the setting of moderate or high disease activity.

Patient education is often difficult to pursue with the time constraints of a typical rheumatology office visit when other management issues dominate the physician/patient dialogue. Better communication among different specialties (ie, rheumatologists, primary care providers, and cardiologists) and the involvement of other health care providers (pharmacists, nurses, and medical assistants) could improve patient counseling. For patients with low disease activity, shared-care models, in which patients follow up with primary care physicians or nurses clinically experienced in rheumatology, have been found to be successful (15). Similar models could be used to discuss CV health in patients with RA. Nurses can be trained to discuss key points of CV health during regularly scheduled appointments. Longer visit times with nurses are helpful for improving patient understanding, confidence, and satisfaction. Often, understanding the goals of treatment may facilitate patient care and allow individuals to engage in sharing responsibility for their medical management. From the patient perspective, this helps to streamline care and make patients feel more involved and responsible for their health care (5). Because many patients use online resources, educational websites or blogs would be useful. We found that older patients were less likely to be aware of the CVD association with RA, and it is possible that these same individuals would be less likely to access online data in a facile manner. Educational symposiums involving health care providers and patient volunteers may facilitate patient awareness but are associated with a significant additional demand for limited resources.

Interestingly, smoking was associated with a lower understanding of CV risk in RA, and the presence of HTN was associated with less frequent counseling by rheumatologists, as reported by patients. Diminished understanding in smokers highlights another important gap in CV health monitoring and needs to be addressed by rheumatologists and other health care providers while also educating on the negative effects of smoking on the RA disease process itself (16). Patients with HTN are more likely to be monitored by cardiologists and primary care physicians for CV risk and may not be counseled by rheumatologists. Additional counseling about CV risk in RA, however, may still provide important information and motivation for these patients because a face-to-face interaction with a trusted provider is likely to have a greater impact than an impersonal data source. Blood Pressure (BP) Connect is an interesting method that has been used by rheumatology practices successfully for adequate management of HTN. Medical assistants and nurses were trained to discuss the importance of BP control and of connecting rheumatic diseases with CV health, and they helped the patients make an early appointment with their primary care providers to address suboptimal BP control. Implementation of BP Connect resulted in quick follow-up appointments with primary care practitioners and improvement in BP control in patients at rheumatology practices (17). This approach could be used for discussing CV health and could help patients to make necessary medical appointments for CV health maintenance.

Our study has several limitations. It is a single-center study with a relatively small cohort size; most of the patients were older white women and were following up with one specific rheumatology group. Our results may not be generalizable to other practices. However, our findings are consistent with prior studies with much smaller numbers of subjects (11,12). Many patients were not reachable, leading to potential response bias, although the majority of patients who were reachable agreed to participate. We acknowledge that patients who were responders could have differences in socioeconomic status, disability, disease activity, or trust in the health care system, but these factors could not be assessed. Because our findings are based on patient-reported interview data, some of the clinical information, such as presence of medical problems such as CVD, HTN, DM, and HL, may be imperfect. Almost 75% of our patients had a disease duration of more than 10 years, limiting precision for analyses assessing the impact of disease duration. It is, of course, possible that patient counseling by the physician may not be recalled. Nevertheless, our report of patient recollection of counseling reflects the effective outcome of this interaction that patients can then incorporate into their daily routine, and this may be more meaningful than counseling documented in the chart. Another limitation in the study is the lack of detailed information about the websites that patients used to learn about CV risk in RA. The strengths of our study approach include a one-on-one personal interview with a significantly larger and more contemporaneous sample than has been previously reported.

In conclusion, our study demonstrated low patient awareness of CV risk associated with RA and low rates of patient-reported counseling by physicians. There is an unmet need to educate patients about the number-one comorbidity of RA. The goal to educate patients with RA about CV risk may be achieved by a multimodal approach including in-office and various out-office educational programs involving health care providers at various levels and the active participation of our patients.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be published. Dr. Banerjee had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Banerjee, Kremer.

Acquisition of data. Singh, Tchervenkov, Van Heusen, Tageldin, Riley, Shaukat, Demenagas, Le, Oliveira, Kwon.

Analysis and interpretation of data. Banerjee, George, Feustel.

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