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Staying in the labor force among patients with rheumatoid arthritis and associated factors in Southern Brazil

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Abstract

Background: Rheumatoid arthritis primarily affects the working-age population and may cause key functional and work limitations. As the disease progresses, individuals become increasingly unable to conduct daily activities, which has a substantial personal and socioeconomic impact. Fairly recent prior studies showed that patients with RA stop working 20 years earlier than age-matched controls. Factors related to sociodemographic, clinical, care and disease profiles might affect the loss of work capacity. The purpose of this study was to assess the factors associated with the prevalence of working patients with rheumatoid arthritis in the municipality of Blumenau.

Methods: A cross-sectional, population-based study was conducted between July 2014 and January 2015, with 296 individuals aged 20 years or older, male and female, living in Blumenau, Santa Catarina state, Brazil, and diagnosed with rheumatoid arthritis according to the 1987 American College of Rheumatology criteria. The prevalence of working patients with RA was assessed by employment status self-reporting during the interview. The chi-squared test, Wald test and Poisson regression analysis were used to test the possible associations between the independent variables and outcome.

Results: The prevalence of working patients with rheumatoid arthritis was 44.3%. Patients aged 20 to 59 years had a 90% higher prevalence of outcome than subjects aged 60 years or older. The prevalence of working patients was 132% and 73% higher among individuals with low income and high functional disability, measured using the Health Assessment Questionnaire (HAQ), respectively.

Conclusion: The prevalence of working RA patients was highest among adult patients with low income and high functional disability. The first variable is directly related to the individual characteristic, the second reflects the socioeconomic context of the patient, and the third reflects the degree of disability caused by the disease, which may be modifiable by health professionals.

Keywords: Rheumatoid arthritis, Occupation, Job market

Background

Rheumatoid arthritis (RA) is a chronic, autoimmune, and systemic inflammatory disease characterized by symmetrical synovitis of the peripheral joints. Inflammation of the synovial membranes causes pain, edema and stiffness and, if untreated, may lead to joint destruction and a loss of functional capacity [1, 2]. RA occurs in 0.24% to 1% of the population, predominantly among women between the fourth and sixth decades of life [3, 4]. According to a multicenter study, the prevalence of RA in Brazil is similar, ranging from 0.2 to 1% of the population [5].

RA primarily affects the working-age population and may cause key functional and work limitations [6]. As the disease progresses, individuals become increasingly unable to conduct daily activities, which has a substantial personal and socioeconomic impact [7, 8]. Studies report that 40% of patients with early-onset disease and

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60% of patients with advanced disease were unable to work [9, 10].

Fairly recent prior studies showed that patients with RA stop working 20 years earlier than age-matched controls [11]. Researchers who conducted a study in Germany concluded that 59% of patients continued working until 12 months after diagnosis, whereas 17% stopped working and received disability payments, and 9% lost their jobs because of RA but received no disability pension [12]. Another study, conducted in the state of São Paulo, showed that 30% of patients were actually employed and that the others were homemakers, on leaves of absence or unemployed [13].

Factors related to sociodemographic, clinical, care and disease profiles might affect the loss of work capacity. Early diagnosis combined with disease-modifying anti-rheumatic drugs (DMARDs) is the most effective method to reduce the prevalence of disability [13]. Other predictors, such as age, education level, the presence of comorbidities and the use of biopharmaceuticals may also be associated with disease progression [13, 14].

Studies on RA among working-age populations are increasingly conducted in developed countries. However, few studies considering this approach in Brazil were identified. Among them, a study conducted in the state of São Paulo determined that 30% of such patients were actively working, 34% were unemployed, 31% were retirees, and 5% were working retirees [15].

To collect additional data on this subject, the present study aimed to assess the percentage of and the possible factors associated with working patients with RA in Blumenau.

Methods

This cross-sectional, population-based study was conducted between July 2014 and January 2015, with 296 individuals aged 20 years or older, male and female, living in the municipality of Blumenau in the south region of Brazil and diagnosed with rheumatoid arthritis according to the 1987 American College of Rheumatology criteria. According to the United Nations Development Program (UNDP), this municipality had a Human Development Index (HDI) of 0.806 in 2010, ranking 25th among Brazilian municipalities [16]. The number of inhabitants in the study age group corresponded to 221,839 people, which is equivalent to 71.7% of the municipality population [17].

The formula for calculating the sample size required to estimate the prevalence of an event in a simple random sample was used considering the following parameters: 0.5% RA prevalence (1110 patients), 50% prevalence of exposure and unknown outcome, 5% sample error and 95% confidence level. The effective calculated sample size was 286 individuals. The participants

were recruited from all primary care centers (Unidades Básicas de Saúde – UBS), the specialty outpatient clinic and the specialty pharmacy of the municipality.

Sample loss occurred when households were visited twice, once on the weekend and again in the evening, and no resident was at home, the resident had moved or refused to participate in the study on both occasions. The data collection team consisted of a local supervisor docent and 8 medical academics of the Regional University of Blumenau (Universidade Regional de Blumenau – FURB) previously trained to conduct structured interviews at home and, if necessary, by telephone. Quality control was performed in 20% of respondents, who were interviewed for the second time using a short questionnaire.

The dependent variable analyzed was the employment status at the time of the interview, considering the prevalence of working patients with RA, in any type of occupation, the outcome. Conversely, the independent variables were selected based on the sociodemographic, clinical, care and disease profiles. The following sociodemographic variables were analyzed: sex, age in completed years, ranging from 20 to 59 years for adults and 60 years or older for the elderly, in accordance with the status of the elderly/Ministry of Health (Ministério da Saúde – MS), current monthly personal income, ranging from 0 to 2 and greater than 2 minimum wages, education in years of completed study and self-reported skin color, categorized as white, brown, black, yellow or indigenous (IBGE). The clinical variable analyzed was the presence of comorbidities. The care variables analyzed were consultations with another rheumatologist during their treatment, number of consultations with a rheumatologist in the last 12 months, type of medical care classified into two groups, the Unified Health System (Sistema Único de Saúde – SUS; free, public healthcare system) and Public-Private Healthcare (supplementary healthcare system), defined according to the MS, in addition to private healthcare (fee-for-service care), and diagnostic delay in months, which was calculated by subtracting the date of the medical diagnosis by the date of the onset of symptoms. Lastly, the disease-related variables were total disease time in months, current use of DMARDs (methotrexate, sulfasalazine, leflunomide and antimalarial drugs), current use of anti-TNF immunobiologicals (adalimumab, etanercept, infliximab), Health Assessment Questionnaire (HAQ) score, ranging from 0 to 1 (mild disability) and from 1.1 to 3 (moderate and severe disability), presence of rheumatoid factor lower than or equal to 60 (negative or low titer) or higher than 60 (high titer) and, finally, the presence of radiographic changes (joint erosion) in the hands.

The data were entered into a system developed for this study in an Excel file format, and the final file was subsequently exported to the software Stata 10.0 (Stata

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Corporation, College Station, United States). The distribution of the variables of interest was analyzed using the mean, standard deviation and median for continuous variables, and the frequency and percentage for categorical variables. To test the association between the employment status and the independent variables, the chi-squared test and, where appropriate, the Wald test were used. Then, crude and Poisson regression analyses were performed to assess the association between the study factors and the dependent variables, estimating the crude and adjusted prevalence ratios (PRs), the respective 95% confidence intervals and the p value.

All variables with p value < 0.20 in the crude analysis were considered for entry into the final model. The variables that maintained a p value ≤0.05 or that fitted the final model remained in the adjusted regression model. The researchers chose to sequentially include sociodemographic, clinical, care and disease-related variables in the regression model.

This research study was submitted to the research ethics committees of the University of São Paulo (Universidade de São Paulo – USP) and of the FURB (protocol numbers 339/13 and 133/12, respectively) and approved; all participants signed the informed consent form.

Results

A total of 336 patients were identified. After excluding deceased patients and those who refused to participate in the study or patients without data for the dependent variable, 296 patients were included in the study. Those individuals who were unemployed, pensioners, housewives or regular or RA-unrelated disability retirees were excluded from the analysis of the dependent variable data, which resulted in an effective final sample of 185 patients (Fig. 1).

In the sociodemographic analysis, females (82.7%) and adults (71.9%) accounted for most individuals, with a mean age of 54.5 years, ranging from 26 to 79 years and with a standard deviation (SD) of 10.4. The mean income was 1.9 minimum wages (SD: 1.4). Approximately one-third of the subjects had education ranging from 0 to 4 years of completed study, with a mean education of 7.9 years (SD: 4.3). Regarding the care variables, the diagnostic delay was longer than or equal to 4 months in 74.1% of the sample and the mean diagnostic delay time was 27.6 months, ranging from 1 to 240 months (SD: 45). Most respondents stated that they visited another rheumatologist (72.4%), with a mean of 3.4 visits in the last 12 months (SD: 2.4). Regarding the type of care, private or public-private healthcare was predominant (55.9%). The analysis of the disease variables showed that most subjects had a disease time longer than or equal to 25 months (89.9%), with a mean of 127.8 months, ranging from 2 to 420 months (SD: 95.8; Table 1).

Fig. 1 Flowchart of the sample
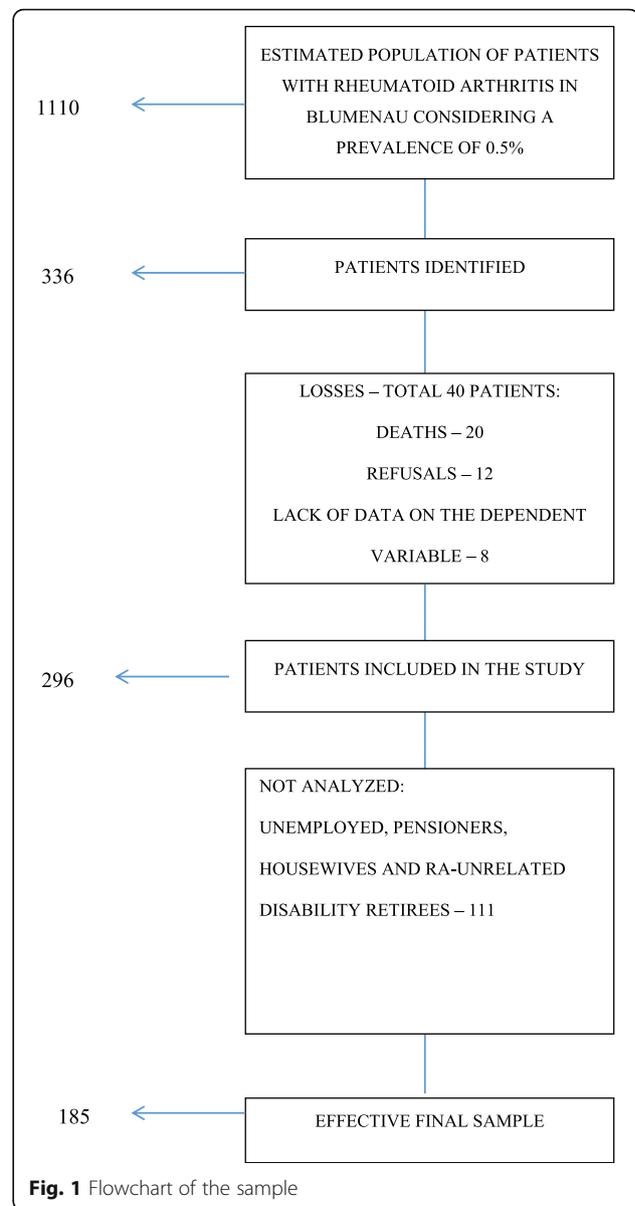
The crude analysis showed an increase in outcome with the decrease in age and among low-income individuals. The prevalence of working patients with RA was 64%, 37% and 66% higher among patients with up to 4 years of education, comorbidities and a higher HAQ score, respectively. Due to confounding between education and income in the adjusted analysis, the variables education and comorbidities lost significance and were excluded from the final model, which consisted of age, income and HAQ. The prevalence of working patients was 90% higher among adults than among the elderly. The prevalence of working patients was 132% higher among low-income individuals than among those earning more than 2 minimum wages. The prevalence of working patients was 73% higher among individuals with

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Table 1 Description of the sample and of the prevalence of working patients with rheumatoid arthritis in Blumenau, Santa Catarina state, Brazil, according to the independent variables, 2014

Variables	Sample		Working Patients	
	n^{*}	%	Prevalence (%) 95% CI	p
Total	185	100.0	44.3 (37.0-51.5)	
Sex (n = 185)				0.943[**]
Male	32	17.3	43.7 (25.5-61.9)	
Female	153	82.7	44.4 (36.4-52.4)	
Age in years (n = 185)				0.025[***]
20-59 (adults)	133	71.9	48.8 (40.2-57.4)	
≥ 60 (elderly)	52	28.1	32.6 (19.5-45.8)	
Income in minimum wages (n = 154)				0.001[***]
0-2	117	75.9	34.1 (25.5-42.9)	
> 2	37	24.1	64.8 (48.2-81.0)	
Education in completed years (n = 176)				0.000[***]
0-4	60	34.1	25.0 (13.7-36.2)	
> 4	116	65.9	54.3 (45.1-63.5)	
Self-reported skin color (n = 178)				0.686[**]
White	165	92.7	44.2 (36.5-51.9)	
Brown and black	13	7.3	38.4 (7.8-69.0)	
Presence of comorbidities (n = 181)				0.016[**]
No	87	48.1	52.8 (42.1-63.5)	
Yes	94	51.9	35.1 (25.2-44.9)	
Consultation with another rheumatologist (n = 181)				0.900[**]
No	50	27.6	44.0 (29.7-58.2)	
Yes	131	72.4	45.0 (36.4-53.6)	
Number of visits in the last 12 months (n = 176)				0.111[***]
0-2	74	42.1	51.3 (39.6-63.0)	
≥ 3	102	57.9	39.2 (29.5-48.8)	
Type of medical care (n = 163)				0.637[**]
SUS	72	44.1	40.2 (28.6-51.8)	
Private and Public-Private Partnership	91	55.9	43.9 (33.5-54.3)	
Diagnostic delay in months (n = 178)				0.982[***]
0-3	46	25.9	45.6 (30.6-60.6)	
≥ 4	132	74.1	45.4 (36.8-54.0)	
Disease time in months (n = 185)				0.681[***]
0-24	20	10.9	4.0 (16.4-63.5)	
≥ 25	165	89.1	44.8 (37.1-52.5)	
Current use of DMARDs (n = 168)				0.724[**]
No	46	27.3	45.6 (30.6-60.6)	
Yes	122	72.7	42.6 (33.7-51.5)	
Current use of biologicals (anti-TNF) (n = 172)				0.162[**]
No	116	67.4	42.2 (33.1-51.3)	

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Table 1 Description of the sample and of the prevalence of working patients with rheumatoid arthritis in Blumenau, Santa Catarina state, Brazil, according to the independent variables, 2014 *(Continued)*

Variables	Sample		Working Patients	
	n[*]	%	Prevalence (%) 95% CI	*p*
Yes	56	32.6	53.5 (40.0-67.0)	
HAQ score (*n* = 110)				0.009[***]
0-1	45	41.0	62.2 (47.4-76.9)	
1.1-3	65	59.0	36.9 (24.8-48.9)	
Rheumatoid factor (*n* = 160)				0.873[**]
0-60 (normal or low titer)	90	56.2	45.4 (35.0-56.0)	
≥ 61 (high titers)	70	43.8	44.2 (32.3-56.2)	
Radiography of hands with joint erosion (*n* = 151)				0.375[**]
No	62	41.0	50.0 (37.1-62.8)	
Yes	89	59.0	42.6 (32.2-53.1)	

95% CI 95% confidence interval
[*]Number of working patients with rheumatoid arthritis who were on sick leave or were disability retirees
[**]Chi-squared test
[***]Wald test

high functional disability, assessed using the HAQ (Table 2).

Discussion

The present study showed that job retention among RA patients in the city of Blumenau was 44.3%. Higher percentages of working RA patients were identified among low-income adult RA patients with high functional disability. The first variable is directly related to individual characteristics, the second reflects the socioeconomic context of the patient and the third reveals the degree of disability caused by RA.

Studies conducted in Germany and the Netherlands found 41% and 40% working RA patients, respectively [12, 18]. Furthermore, a systematic review of North American data found rates of working RA patients ranging from 22% to 76% [19]. Regarding the Brazilian data, a study conducted in Sorocaba found a prevalence of 46% working RA patients, similar to that found in the present study [20]. However, another study conducted in São Paulo found a 31% prevalence of such working patients, possibly due to different inclusion criteria and sampling and to the use of secondary data from medical records [13].

Age is a non-modifiable predictive factor of work disability. Our study confirmed this finding because the prevalence of working RA patients among elderly individuals was almost twice as high as that among adults. Synergistically, two systematic reviews of cohort studies on disability also reported the existence of this relationship [21, 22].

A study with 878 patients, conducted in the Netherlands, showed that a low socioeconomic status was related to worsened disease activity, physical and mental health and quality of life [23]. Similarly, a Latin American cohort with 1093 patients from 14 countries, including Brazil, concluded that low and middle incomes were associated with increased disease activity and higher HAQ scores [24]. Notably however, this association has not been consistently reported [25].

In contrast to the aforementioned findings, our study found a prevalence of working RA patients among low-income individuals who was 132% higher than that among individuals with a higher income. This finding suggests social inequality because the prevalence of working RA patients was expected to be higher among individuals with a higher income considering that higher income is usually associated with easier access to information, medical consultations and pharmacological treatments. This finding may be due to circumstances directly related to the individual, such as a lack of access to information, lack of knowledge of the right to disability retirement, limited legal expenses, lack of payment to social security and the need to work to avoid income loss.

Regarding the HAQ, the results showed that the prevalence of working RA patients was 73% higher among individuals with high disability than among individuals with a low HAQ score. This finding may be related to low-income patients with increased inflammatory activity of the disease and, therefore, increased disability [24]. Although this variable had a lower sample number than the others, an association with outcome was observed. An English study of two cohorts, totaling 244 patients, described HAQ as the most important factor of work disability [26].

Regarding education, the prevalence of working RA patients among the group with more than 4 years of study was 64% higher in the crude analysis; however,

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Table 2 Crude and adjusted Poisson regression analyses of the prevalence of working patients with rheumatoid arthritis as a function of independent variables in Blumenau, Santa Catarina state, Brazil, 2014

Variables	Crude analysis		Adjusted analysis	
	PRc (95% CI)	p	PRa (95% CI)	p
Sex (n = 185)		0.943[*]		NS
Male	0.98 (0.70-1.38)			
Female	1			
Age in years (n = 185)		0.023		0.001
20-59 (adults)	1.33 (1.04-1.71)		1.90 (1.31-2.75)	
≥ 60 (elderly)	1		1	
Income in minimum wages (n = 154)		0.007		0.008
0-2	1.87 (1.18-2.96)		2.32 (1.24-4.36)	
> 2	1		1	
Education in completed years (n = 176)		0.000		0.676[**]
0-4	1.64 (1.28-2.10)		1.08 (0.74-1.58)	
> 4	1		1	
Self-reported skin color (n = 178)		0.669[*]		NS
White	1			
Black + Brown	1.1 (0.70-1.73)			
Presence of comorbidities (n = 181)		0.019		0.464[**]
No	1		1	
Yes	1.37 (1.05-1.80)		1.08 (0.74-1.58)	
Consultation with another rheumatologist (n = 181)		0.900[*]		NS
No	1			
Yes	0.98 (0.73-1.31)			
Number of visits in the last 12 months (n = 176)		0.121		0.619[**]
0-2	1.03 (0.99-1.08)		0.91 (0.65-1.28)	
≥ 3	1		1	
Type of medical care (n = 163)		0.637[*]		NS
SUS	1.06 (0.81-1.38)			
Private + Public-Private Partnership	1			
Diagnostic delay in months (n = 178)		0.982[*]		NS
0-3	1			
≥ 4	1.01 (0.73-1.36)			
Disease time in months (n = 185)		0.667[*]		NS
0-24	1			
≥ 25	0.91 (0.62-1.35)			
Current use of DMARDs (n = 168)		0.729[*]		NS
No	0.94 (0.69-1.28)			
Yes	1			
Current use of biologicals (n = 172)		0.184		0.481[**]
No	1.24 (0.90-1.71)		1.17 (0.79-1.73)	

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Table 2 Crude and adjusted Poisson regression analyses of the prevalence of working patients with rheumatoid arthritis as a function of independent variables in Blumenau, Santa Catarina state, Brazil, 2014 *(Continued)*

Variables	Crude analysis		Adjusted analysis	
	PRc (95% CI)	p	PRa (95% CI)	p
Yes	1		1	
HAQ (*n* = 110)		0.017		0.017
0-1	1		1	
1.1-3	1.66 (1.09-2.54)		1.73 (1.10-2.72)	
Rheumatoid factor (*n* = 160)		0.873**		NS
0-60 (normal or low titer)	1			
≥ 61 (high titers)	1.02 (0.77-1.35)			
Radiography of hands with joint erosion (*n* = 151)		0.385**		NS
No	1			
Yes	1.14 (0.84-1.55)			

95% CI 95% confidence interval, *NS* non-significant *p* value, *PRc* crude prevalence ratio, *PRa* adjusted prevalence ratio
*Excluded from the adjusted analysis (*p* value > 0.20)
**Excluded from the final model (*p* value > 0.05)

when subjected to adjusted analysis, the variable lost significance. Despite this result, a systematic review of studies on RA found a significant association between higher levels of education and the prevalence of working patients [21]. The same result was found regarding the presence of comorbidities, which was initially 37% higher among working RA patients, although the lack of a significant association was subsequently assessed. A Saudi study also found no significant association between the prevalence of working patients and the presence of co-morbidities, although comorbidities were found in 95% of the subjects [27]. Conversely, a longitudinal study conducted in the United States with patients from the National Data Bank for Rheumatic Diseases, a national database for rheumatologic diseases, found progression of work disability, particularly in individuals with cardiovascular disease and a high number of comorbidities [28].

Regarding the sociodemographic profile variables, although sex and self-reported skin color were not significantly associated with the outcome (possibly due to the predominance of white over brown and black individuals in the sample), studies describing significant associations between these variables and the prevalence of working patients have been reported in the literature. A study showed that women had a higher risk for being out of the labor force, whereas men were more likely to continue working and to report negative workplace experiences [29].

Regarding the care variables, a Brazilian study showed that diagnostic delay may increase the prevalence of loss of work capacity and found a mean diagnostic delay of 39 months [20]. Although a lower mean diagnostic delay was found in our study (27.6 months), the importance of this variable for early treatment is noteworthy.

Regarding the disease variables, disease time is directly related to decreased prevalence of working RA patients.

A cohort of Swedish patients with RA followed for 15 years showed that after 5, 10 and 15 years of disease, 65%, 61% and 56% of the individuals were actively working, respectively [30]. The lack of association and the decreased prevalence of outcome in our study may be related to the sample, which predominantly consisted of patients with established RA (> 2 years), to the mean disease time of approximately 10 years and to the fact that most subjects had higher levels of education.

Although the prevalence of working RA patients was not associated with the use of DMARDs or anti-TNF biologicals, several studies showing that these drugs may decrease the number of sick-leave days have been published [31–33]. The work capacity of patients may approximate that of healthy individuals during early treatment [34, 35].

The study limitations might include methodological differences caused by the lack of consistency in defining work disability [10], specific population characteristics, the very high HDI of the municipality of Blumenau (which differs from the rest of the country), the sample losses of some variables such as the HAQ score (which would likely be more significantly associated with the prevalence of working RA patients in a larger sample), possible memory biases of the respondents and reverse causation typical of cross-sectional studies.

The strengths of the study were the representative sample of the population of the municipality where the study was conducted (encompassing all social classes), the interviews conducted through pre-structured questionnaires by trained staff and the quality control of the interviews. The labor market context presumably had no effect on the results because the unemployment rate in Brazil in the study period ranged from 4.3% to 5.3%, in contrast to Blumenau, which had a 2% unemployment rate in 2014. Furthermore,

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the state of Santa Catarina had the lowest unemployment rate of all Brazilian states in 2015 (IBGE).

Conclusion

This study analyzed the prevalence of RA patients in the labor market in a southern region of Brazil. A higher prevalence of working RA patients was found among adult, low-income individuals with high functional disability. We suggest new population-based studies to improve the consistency of information on the employment status of patients with RA and to signal future budgetary impacts on social security.

Abbreviations
DMARDs: Disease-modifying antirheumatic drugs; FURB: Regional University of Blumenau; HAQ: Health assessment questionnaire; HDI: Human development index; MH: Ministry of Health; PR: Prevalence ratios; RA: Rheumatoid arthritis; SD : Standard deviation; SUS: Unified Health System; UBS: Primary care centers; UNPD: United Nations Development Program

Availability of data and materials
All data generated and analysed during this article are part of the project: Cohort study of patients with rheumatoid arthritis of the municipality of Blumenau.

Authors' contributions
RKSG and MRCN contributed to elaboration, literature review, statistical analysis and article writing. LCS, MOV and PHM contributed to writing and literature review. All approved final version for submission in journal.

Ethics approval and consent to participate
Submitted to the research ethics committee of the University of São Paulo (USP) and Blumenau Regional University Foundation (FURB) (protocol n°.339 / 13 and 133/12, respectively).

Competing interests
The authors declare that they have no competing interests.

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