Health Status Indicators Among Community-Dwelling Elders with Arthritis: The Bambuí Health and Aging Study

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ABSTRACT. ***Objective.*** To investigate the association of arthritis with health status indicators among elders living in Bambuí, Brazil.

Methods. A cross-sectional study was conducted among 1606 elders using baseline data from the Bambuí Health and Aging Study, a population based cohort study of older adults. Arthritis was self-reported and defined as a physician diagnosis of arthritis or rheumatism, and/or chronic hand and knee symptoms. Health status indicators, defined *a priori* as the main independent variables, were self-rated health, psychological distress (based on the General Health Questionnaire), report of sleep complaints, disability in activities of daily living (ADL), "2-week" disability, mobility disability, and 2 composite indexes of mental health problems and physical disability problems. Logistic regression compared health status indicators among elders reporting arthritis (N = 833) and non-arthritis subjects.

Results. After controlling for sociodemographics and chronic conditions, all measures were found to be associated with arthritis: sleep complaints (OR 1.81, 95% CI 1.43–1.92), fair (OR 2.17, 95% CI 1.62–2.90) and poor self-rated health (OR 3.48, 95% CI 2.46–4.94), ADL disability (OR 1.73, 95% CI 1.02–2.87), mobility disability (OR 2.65, 95% CI 2.06–3.41), 2-week disability (OR 1.86, 95% CI 1.35–2.57), 2 mental health problems (OR 2.25, 95% CI 1.67–3.04), and one (OR 2.46, 95% CI 1.91–3.16) and 2 physical disability problems (OR 4.19, 95% CI 2.02–8.59).

Conclusion. Considering the paucity of similar studies addressing the impact of arthritis in developing nations, these findings may be applied to similar communities and support better planning of resource allocations to minimize the effects of arthritis among the elderly. (J Rheumatol 2006;33:342–7)

Key Indexing Terms:

ARTHRITIS   ELDERLY   HEALTH STATUS   DISABILITY   POPULATION BASED STUDY

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As a result of better living conditions, lower mortality from infectious diseases, and better management of chronic health problems such as cardiovascular diseases, diabetes and cancer, some populations are living longer, and the number of elders living with chronic disabling conditions such as arthritis is increasing[1-3].

At older ages, arthritis is one of the most prevalent chronic conditions, and more than 90% of the elders reporting arthritis will have osteoarthritis (OA) as a medical diagnosis, affecting mainly the knees, hands, and hips[4]. Estimates of the prevalence of arthritis based on population surveys vary according to the case definition of this chronic condition. In the United States, the prevalence of self-reported arthritis and/or chronic joint symptoms among individuals more than 65 years of age was estimated to be more than 60%[5]. In Canada, the prevalence of self-reported arthritis/rheumatism diagnosed by a health professional was higher among women and increased progressively with age, ranging from 25% (men) and 40% (women) at ages 60–64 years to 40% (men) and 57% (women) at 80–84 years[6].

Besides its high prevalence, arthritis has a large influence on health status of elderly populations, and among all chron-

ic conditions it is the leading cause of longterm disability[7,8]. The symptoms attributed to arthritis substantially affect quality of life, including troubles with mobility, dependence, everyday living activities, and social isolation[9-11]. The longterm course makes arthritis one of the most costly illnesses, not only in terms of healthcare utilization[12] but also indirect costs related to longterm disability[13,14].

In Brazil, a national survey based on a representative sample of the elderly population showed that the prevalence of self-reported arthritis was 38%, and it was the second most prevalent chronic condition after hypertension[15]. Another study conducted in a sample of a large Brazilian city, using case definition for rheumatic diseases based on a screening questionnaire and physical examination, showed that the prevalence of OA among individuals ≥ 55 years of age ranged between 11% and 35%[16,17]. Another Brazilian population based cross-sectional study investigated the prevalence of arthritis and chronic knee and hand symptoms among 1606 elders (age ≥ 60 yrs) living in Bambuí, a small community, and showed that the prevalence of self-reported physician diagnosis of arthritis was 25% (40% among women, 15% among men), prevalence of self-reported chronic knee and hand symptoms was 44%, and prevalence of physician diagnosis of arthritis and/or chronic knee and hand symptoms was 52%. Chronic knee and hand symptoms were associated with female sex, < 8 years of education, body mass index > 25 kg/m^2, report of previous heart attack, stroke symptoms, and Chagas' disease[18].

The Brazilian population is getting progressively older. The proportion of people aged ≥ 60 years increased from 7.9% in 1996 to 8.6% in 2000 (> 14 million elders) and is estimated to increase to 27 million in 2025[3,19]. This demographic scenario represents a challenge for social and health planners and requires increasing provision of health services, especially for chronic conditions[20]. Considering the aging of the Brazilian population and the need to address the impact of disabling chronic conditions such as arthritis, we investigated the association of arthritis with health status indicators among elders living in Bambuí, Brazil.

MATERIALS AND METHODS

Data source. Subjects in this study were participants in the baseline component of the Bambuí Health and Aging Study (BHAS), a population based cohort study of older adults carried out in Bambuí, Minas Gerais, Brazil[21]. The study was conducted in the urban area, which in 1991 comprised 73% of the 20,573 inhabitants of the municipality. At the time of the study, life expectancy in Bambuí was 70 years and causes of death were mainly related to cerebral-vascular disease, coronary heart disease, and Chagas' disease. Because the transmission of *Trypanosoma cruzi* was interrupted only around 20 years before the study, both the prevalence of infection and mortality among the aged remains high[22].

To identify participants for the cohort study, a complete census was carried out in the town of Bambuí in November and December 1996 and all individuals age ≥ 60 years (1742 elders) were selected to take part in the baseline study. From January to August 1997, 1606 of them were interviewed and 1496 were examined for blood testing and anthropometric and blood pressure measurements. A proxy respondent was used for 90 elders who were unable to answer the questions because of health problems such as cognitive deficit[21]. The majority of participants (80.6%) had visited a physician within the year before the interview. Complete data on all measurements were available for 1364 subjects.

Definition of arthritis. Arthritis was defined as either a self-reported diagnosis of arthritis or rheumatism by a physician, or a self-report of chronic hand and knee symptoms. Case definition of arthritis diagnosed by a physician was based on the question: "Do you have arthritis or rheumatism?". If the response was "Yes," another question was asked: "How did you know you have arthritis or rheumatism?". One of the response options was: "By a physician." Definitions of chronic knee and hand symptoms were based on a positive answer to at least one of the following questions: (1) "Have you ever had pain in your hands/knees on most days for at least 6 weeks? This also includes aching or stiffness." (2) "Have you ever had swelling in your hands/knees that hurt when the joint was touched on most days for at least 6 weeks"?. (3) "Have you ever had stiffness in your hands/knees when first getting out of bed in the morning on most days for at least 6 weeks?". These questions were based on a questionnaire used in the US Third National Health and Nutrition Examination Survey[23].

Health status indicators. The following variables were included as health status indicators: self-rated health, psychological distress, report of sleep complaints, self-report of disability in activities of daily living (ADL), "2-week" disability, and mobility disability. Self-rated health (very good/good/fair/poor) was a measure of health status in the 6 months prior to the interview. Assessment of psychological distress was based on the 12-item version of the General Health Questionnaire (GHQ), considering symptoms that had occurred in the preceding 2 weeks, using the cutoff score of ≥ 4 on the GHQ, as evaluated in a Brazilian population[24,25]. Report of sleep complaints was based on a structured questionnaire previously used in the same population, which addressed any complaint in the preceding 30 days concerning difficulty in initiating sleep, frequency of disrupted sleep, early morning awakening, interference with personal functioning in daily living, and use of sleeping medications[26]. Self-report of disability in ADL considered the inability to perform at least one of the following activities: bathing, dressing, transferring from bed to chair, using the toilet, and eating[27]. Community mobility disability was defined by self-report of any difficulty in walking a distance of 300 meters. Two-week disability was defined as self-report of being unable to perform routine activities because of a health problem in the preceding 2 weeks. Two composite indexes were created: an index of physical disability problems aggregating the measures of ADL and mobility disability, and an index of mental health problems aggregating measures of sleep complaints and psychological distress.

Sociodemographic data and chronic conditions. We included in the study some variables that could be possible confounders or had been previously shown to be associated to arthritis in the same population[18]. The measure of family income represented the total household income from everyone living in the home, before taxes, and was based on increments of minimum wages in Brazil (approximately US$ 120.00 monthly) at the time of the interview. Formal education was assessed by the number of complete years the elder had attended school. Self-report of diagnosis of Chagas' disease and previous heart attack were based on questions asking if a physician had ever said they had these health problems. Report of stroke symptoms was based on a positive answer to at least one of 4 questions about cerebral-vascular symptoms. Systemic hypertension was defined as measured blood pressure ≥ 140 mm Hg (systolic) or ≥ 90 mm Hg (diastolic) or use of anti-hypertensive medication for the management of hypertension at the time of the interview. Diabetes was defined as measured blood glucose ≥ 126 mg/dl or use of medication for the management of diabetes at the time of the interview. Smoking was defined by reported lifetime smoking of at least 100 cigarettes and still being a smoker at the time of the interview. Obesity was defined as measured body mass index > 30 kg/m^2.

Data analysis. Crude prevalence of each health status indicator was assessed, comparing proportions among elders with and without arthritis,

based on chi-square tests. The frequency of the 6 health status indicators was compared by sex and age groups for elders reporting arthritis. Finally, a series of logistic regression analyses was carried out to assess the magnitude of association among arthritis and each one of the 6 health status indicators as well as the 2 composite indexes, defined *a priori* as the main independent variables. Crude and adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated. Two groups of covariates (sociodemographic data followed by chronic conditions) were entered in different steps of the analysis to determine potential relationships with the main independent variables.

The study was part of a larger project approved by the Ethics Committee of Oswaldo Cruz Foundation, Brazil. Participation was voluntary and written informed consent was obtained for the interviews, physical measurements, and blood tests[21].

RESULTS

Most elders who participated were female, < 70 years of age, married or living with a partner, with < 3 years of formal education, and with family incomes < 4 times Brazilian minimum salary (Table 1). Whatever the case definition, the prevalence of arthritis was high among this elderly population. More than half (52%) reported physician diagnosis of arthritis and/or chronic knee or hand symptoms and fulfilled the study definition for arthritis. Other highly prevalent chronic conditions were hypertension, Chagas' disease, and diabetes (Table 2).

The frequency of all health status indicators was higher (p < 0.001) among elders with arthritis, compared to non-arthritis subjects. More than half the elders reporting arthritis referred to fair/poor health, psychological distress, and mobility disability, and almost half reported some type of sleep complaint. Among elders with arthritis (N = 833), the

Table 1. Distribution of sociodemographic variables among the elderly population (N = 1606), Bambui Health and Aging Study, 1997.

Variable	N (%)
Sex	
Men	641 (39.9)
Women	965 (60.1)
Age, yrs	
60–64	527 (32.8)
65–69	406 (25.3)
70–74	304 (18.9)
75–79	187 (11.6)
≥ 80	182 (11.4)
Marital status	
Married or live with partner	869 (54.1)
Widowed/divorced/never married	737 (45.9)
Years of formal education	
None	523 (32.5)
1–3	525 (32.7)
4–7	420 (26.8)
≥ 8	128 (8.0)
Family income (increments in Brazilian minimum wages)	
< 2.0	478 (29.8)
2.0–3.9	602 (37.5)
4.0–5.9	236 (14.7)
6.0 –9.9	146 (9.1)
≥ 10.0	144 (9.0)

Table 2. Prevalence of arthritis and other chronic conditions among the elderly population (N = 1606), Bambui Health and Aging Study, 1997.

	Prevalence, %
Arthritis	
Self-reported	31.9
Self-reported physician diagnosis	25.3
Self-report of chronic knee or hand symptoms	44.2
Self-report of physician diagnosis and/or chronic symptoms	51.9
Other chronic conditions	
Self-report of Chagas' disease	25.2
Self-report of previous heart attack	5.0
Self-report of stroke symptoms	4.0
Diagnosis of hypertension	61.5
Diagnosis of diabetes	14.5
Smoking	17.2
Obesity	11.6

prevalence of 4 health status indicators (report of poor self-rated health, psychological distress, sleep complaints, and mobility disability) was higher among women. Comparing different age groups among elders with arthritis, the prevalences of only 2 health status indicators (ADL and mobility disability) were higher among individuals older than 80 years (Table 3).

The final step of the logistic regression analysis showed that, after controlling for sociodemographics and chronic conditions, all specific health status indicators and the 2 composite indexes (physical disability and mental health problems) were associated with arthritis. In the latter case, only the presence of both sleep complaints and psychological distress was statistically significant (Table 4).

DISCUSSION

This study of elders in a Brazilian urban community showed that arthritis was a frequently reported chronic condition and was associated with worse self-rated health and the presence of physical disability and mental health problems.

The finding that the frequency of health status indicators was higher among elders with arthritis is consistent with other studies[5,6,10,28,29]. A study based on a Canadian population sample has shown that, in comparison with elders (age ≥ 60 yrs) not reporting arthritis, a greater proportion of elders with arthritis reported fair/poor health, sleep problems, restriction of daily activities, and also having to stay in bed or reducing activities in the 2 weeks prior to the interview[6]. A study conducted in the USA, using data from a probability sample of community-dwelling persons age ≥ 55 years, showed that seniors with arthritis had more difficulty in physical functions, personal care, and household care, compared to non-arthritis subjects[29]. Our finding that fair and poor self-rated health is more frequent among arthritis compared to non-arthritis subjects is consistent with another US study that analyzed data from the Behavioral Risk Factor Surveillance System showing that, among individuals

Table 3. Prevalence of health status indicators among the elderly population (N = 1606), elders not reporting arthritis (N = 773), and elders with arthritis (N = 833, by sex and age group), Bambui Health and Aging Study, 1997.

Indicator	Prevalence, %						
					Arthritis		
	Population	Non-arthritis	Total[1]	Men	Women[2]	Age 60–79 yrs	Age ≥ 80 yrs[3]
Self-rated health							
Good/very good	24.7	35.2	15.1**	21.1	12.4**	15.1	15.2
Fair	49.2	47.6	50.7**	50.4	50.8	50.8	49.4
Poor	26.1	17.2	34.2**	28.5	36.7**	34.1	35.4
Psychological distress	53.8	46.1	61.0**	55.0	63.6*	60.6	64.6
Sleep complaints	38.8	29.8	47.1**	31.8	53.8**	47.7	41.8
ADL disability	6.8	3.9	9.5**	7.0	10.6	8.2	21.5**
Mobility disability	41.9	28.8	54.0**	43.4	59.0**	50.7	79.4**
Two-week disability	17.0	11.0	22.6**	18.7	24.4	25.5	22.2

* $p < 0.05$ and ** $p < 0.001$, comparing (1) "Total" arthritis and non-arthritis, (2) men and women, and (3) age group 60–79 years and age group ≥ 80 years.

Table 4. Results of logistic regression analysis comparing subjects with arthritis and non-arthritis subjects (N = 1364), Bambui Health and Aging Study, 1997.

	OR (95% CI) for Each Indicator		
	Unadjusted	Adjusted for Sociodemographics* —	— Plus Chronic Conditions**
Health status indicator			
Sleep complaints	2.10 (1.70–2.59)	1.90 (1.51–2.40)	1.81 (1.43–1.92)
Self-rated health (reference: Good/Very good)			
Fair	2.49 (1.92–3.23)	2.30 (1.73–3.05)	2.17 (1.62–2.90)
Poor	4.65 (3.43–6.30)	3.99 (2.86–5.58)	3.48 (2.46–4.94)
Psychological distress (reference: GHQ ≤ 4)	1.83 (1.49–2.24)	1.68 (1.34–2.10)	1.53 (1.22–1.93)
ADL disability	2.62 (1.68–4.10)	2.27 (1.39–3.73)	1.73 (1.02–2.87)
Mobility disability	2.91 (2.36–3.58)	2.97 (2.34–3.79)	2.65 (2.06–3.41)
Two-week disability	2.36 (1.79–3.12)	2.07 (1.52–2.84)	1.86 (1.35–2.57)
Composite indexes			
Mental health problems (reference: no problem)			
Only one	1.43 (1.11–1.85)	1.32 (1.02–1.71)	1.25 (0.95–1.63)
Both	2.90 (2.19–3.84)	2.50 (1.87–3.35)	2.25 (1.67–3.04)
Physical disability problems (reference: no problem)			
Only one	2.89 (2.30–3.63)	2.71 (2.13–3.50)	2.46 (1.91–3.16)
Both	5.48 (2.78–10.81)	5.39 (2.69–10.78)	4.19 (2.04–8.59)

* Adjusted for sociodemographics: age groups (**60–64**, 65–69, 70–74, 75–80, ≥ 80); sex (**female** vs male); family income, in Brazilian minimum salaries (**< 2.0**/2.0–3.9/4.0–5.9/6.0–9.9/≥ 10); years of formal education (**none**/1–3/≥ 4) (reference group in bold type). ** Adjusted for sociodemographics + chronic conditions (Chagas' disease, previous heart attack, stroke symptoms, hypertension, diabetes, smoking, and obesity).

aged ≥ 65 years with arthritis, 40.3% reported fair or poor self-rated health, compared to 7.5% among non-arthritis subjects[10]. The high prevalence of self-reported fair or poor health (75.3%) in the entire study population, in relation to that observed in the US population, may partially explain why the observed difference in prevalence of self-reported fair/poor health between elders with and without arthritis in our study was not as marked as that observed in the American population. The association of mobility disability with arthritis is also consistent with findings from other

studies[9] and may indicate that these elders are likely to have active and progressive OA of the hip or knee.

The association of arthritis and sleep complaints has also been observed in other studies and it is probably related to overnight pain and discomfort, symptoms frequently reported for late-stage hip and knee OA. A study of community-dwelling elders showed that arthritis was associated with sleep related problems such as breathing pauses, snoring, daytime sleepiness, restless legs, and insufficient sleep[30]. A survey among older persons reporting arthritis also showed

that this chronic condition disrupted sleep in 32.8% of respondents[31].

The finding that the frequency of mental health problems was higher among elders with arthritis is consistent with other studies that showed that symptoms such as depression and anxiety were higher among individuals with arthritis[6,32]. In a sample of the Canadian population, elders with arthritis had higher prevalence of depression compared with elders with other chronic conditions[6]. Similar results were found in a study comparing people with arthritis and individuals with no chronic conditions, in relation to mood and anxiety disorders[32]. In our study, the composite index on mental health problems showed that this association was only significant among individuals presenting both psychological distress and sleep complaints. The explanation for this finding is probably related to the high coexistence of these problems, since sleep complaint is a common symptom of depression.

With regard to the methodology of our study, efforts were made to avoid possible sources of bias, such as promoting standardization of procedures and equipment and exhaustive training of the field team. Participation rates varied from 92% (1606/1742) for questions based only on interviews to 78% (1364/1742) when variables based on examinations were analyzed. Participants were similar to the general population of older adult residents in Bambuí with respect to all sociodemographic study variables[21].

There are some concerns in the literature about the validity and reliability of self-report diagnosis of arthritis[33,34]. Although self-reports of musculoskeletal conditions from the elderly may not reveal the presence of asymptomatic joint disease, the majority of persons with painful or functionally significant disease will be determined by this case definition of arthritis[35]. The inclusion of chronic hand and knee symptoms as one of the criteria used to define arthritis may have excessively broadened the case definition. Despite this concern, one must consider that these symptoms are related to OA of the knee and hand, which are the most prevalent types of arthritis, especially among the elderly population[4,36]. As well, self-report of chronic joint symptoms, together with medical diagnosis of arthritis, has previously been used as one of the criteria for case definition of arthritis in surveys conducted in large population based samples in the USA[37], and recently, chronic joint symptoms have been labeled "possible arthritis" and used as a separate criterion for reporting prevalence estimates of this chronic condition[38]. A study addressed the validation of medical diagnosis of arthritis and/or chronic joint symptoms as a case definition for arthritis and, using clinical history and physical examination as a gold standard, showed that among individuals aged ≥ 65 years, sensitivity of the case definition for arthritis was 84% and specificity was 71%[39].

The finding that the 2 composite indexes of physical disability and mental health problems were associated with arthritis highlights the importance of using this strategy to deal with highly correlated variables, even considering that they might express distinct health problems. Previous research combined various health status indicators and aspects of health related quality of life, such as pain and disability, as composite indexes to assess the influence of chronic conditions such as arthritis, for example the Medical Outcome Study Short Form-36 (SF-36) and the Health Utilities Index (HUI)[40,41]. The SF-36 was used to assess health status in a population survey that showed that the scores were significantly worse for respondents with arthritis compared with the rest of the population[42]. A Canadian population based study showed that elders with arthritis had worse scores on the HUI compared to elders with other chronic conditions[6]. Further community based studies should consider using composite indexes to assess the effect of arthritis on closely related health status indicators.

Since our study refers to cross-sectional data, temporal or causal relationships among arthritis and health status indicators cannot be assumed. Longitudinal studies would be necessary to investigate if these health indicators are consequences of incident arthritis.

Our findings are consistent with other studies carried out in developed countries showing that health problems are more frequent among elders with arthritis compared with elders without arthritis. Considering the paucity of similar studies addressing the impact of arthritis in developing countries such as Brazil, and the rigorous methods used in this population based study, our results may be applied to similar communities to support better planning of resource allocation to minimize possible longterm effects of arthritis among the elderly.

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