Employment Across Chronic Inflammatory Rheumatic Diseases and Comparison with the General Population

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ABSTRACT. ***Objective.*** To compare labor force participation across chronic inflammatory rheumatic diseases in order to assess the influence of the disease, disease duration, sex, education, and labor market conditions on employment.

Methods. Data from the German rheumatological database on outpatients of working age (20–59 yrs) between 1993 and 2001 were analyzed. The patients had rheumatoid arthritis (RA; n = 26,071), ankylosing spondylitis (AS; n = 5564), psoriatic arthritis (PsA; n = 6041), systemic lupus erythematosus (SLE; n = 4603), systemic sclerosis (SSc; n = 802), or Wegener's granulomatosis (WG; n = 385). Using population data, standardized employment ratios (SER) and part-time employment ratios of observed versus expected cases with 95% CI were calculated by means of indirect standardization for age and year of documentation.

Results. Across all diseases the overall employment rates were significantly lower than in the general population. Significant differences in SER were found between the diseases. The lowest SER of 0.76 to 0.81 (1.0 = population) were found in patients with RA, SLE, SSc, and WG. Higher SER were seen in AS (0.94) and PsA (0.92). In patients with a disease duration > 10 years the relative risk of being employed compared to RA, was 1.42 for AS, 1.26 for PsA, and 1.15, 1.03, 0.62 for PsA, SLE, SSc and WG, respectively. Comparing areas with low and high unemployment rates, a highly significant influence of labor market conditions on the SER was observed. The SER were significantly lower in patients with < 10 years of school education.

Conclusion. Differences between employment rates in the population and the rates for the diseases under study are smaller than assumed by most clinical studies, especially in AS and PsA. However, these differences increase with longer disease duration. Specific measures to prevent patients from losing their job are needed, especially in areas with overall high unemployment. (J Rheumatol 2005;32:721–8)

Key Indexing Terms:
EMPLOYMENT RHEUMATOID ARTHRITIS ANKYLOSING SPONDYLITIS
PSORIATIC ARTHRITIS SYSTEMIC LUPUS ERYTHEMATOSUS
SYSTEMIC SCLEROSIS WEGENER'S GRANULOMATOSIS

Work loss is one of the most important outcomes of chronic inflammatory rheumatic diseases. Not only may the individual patient be severely affected by reduced income and limited participation in social activities[1,2], but society is also burdened in terms of production loss and costs[3]. Of all rheumatic diseases, the largest body of information is available for rheumatoid arthritis (RA). Within the first 3 to 4 years of RA up to 40% of the patients employed at disease onset have to quit their jobs[2,4-8], inducing considerable indirect costs[9]. In RA the proportion of patients losing their work increases with longer disease duration, and reaches more than 50% after 2 decades[7,10-13]. On the other hand lower

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frequencies of work disability were found in patients with ankylosing spondylitis (AS)[7,14-17]. Only sparse information is available on other chronic inflammatory rheumatic disorders, particularly on diseases with low prevalence such as connective tissue diseases or vasculitis[18-22].

The reported work loss rates vary depending on how attribution to the disease is defined, as shown by a study of RA by Wolfe and Hawley[12]. Based on the patients' statements of disease related work loss, 25% were work-disabled after 6.4 years, in contrast to the 11.0 years that were calculated when the receipt of social security disability benefits served as the criterion for work discontinuation caused by RA.

Work loss attributable to the disease may be assessed through comparison of employment rates in patients and the general population. Using this approach the population background with the different reasons for nonparticipation in the labor force, such as unfavorable labor market conditions, other occupational and societal factors, or personal attitudes, can be considered. Recent studies of RA and AS taking employment in the general population into account yielded conflicting results[18,23-26]. Detailed analyses by means of stratification for age, sex, and other important variables require large data sets. This opportunity is offered by the National Database of the German Collaborative Arthritis Centers, which contains data from patients with different inflammatory rheumatic diseases in rheumatological care[23,27]. Previously we presented the 1993-97 data on crude employment rates of patients with RA, AS, systemic lupus erythematosus (SLE), and vasculitides without standardization[18,23]. The present report is the first comparative study of employment across the most prevalent chronic arthritides [RA, AS, and psoriatic arthritis (PsA)], connective tissue diseases [SLE and systemic sclerosis (SSc)], and Wegener's granulomatosis (WG) considering employment in the general population and the influence of sex, education, and disease duration. The effects of region of residence reflecting labor market conditions, sex, and disease combined with disease duration or education were assessed using the 1993-2001 data of the National Database. Further, the occurrence of part-time employment was analyzed. To allow for comparisons with the general population and across different diseases despite group differences, standardization procedures first established in morbidity and mortality analyses were applied.

MATERIALS AND METHODS

Patients. This is a cross-sectional analysis of the National Database of the German Collaborative Arthritis Centers (NDB) as described[18]. In brief, rheumatologists in 24 arthritis centers have recorded clinical data for all patients with inflammatory rheumatic diseases once a year since 1993, and patients have answered a comprehensive patient questionnaire. Patient inclusion continues. The rheumatologists are supposed to register each outpatient with an inflammatory rheumatic disease except those who refuse to participate. As the rheumatologists use the data for their own statistics, including negotiations with payers, we can assume that patient inclusion is fairly complete. The data are therefore representative for patients treated by rheumatologists in Germany.

The database comprises newly referred as well as prevalent cases. Patients seen on a regular basis are registered once a year. For these patients the same set of information is available for successive years (longitudinal cases). Here we restrict our attention to outpatients of working age (20–59 yrs) entered into the database between 1993 and 2001 with definite diagnoses (RA, AS, PsA, SLE, SSc, or WG) and with data for current employment status. In patients with longitudinal data, the data of the first year of documentation were used. For each year under consideration at least 3270 newly documented patients fulfilled the inclusion criteria. The diagnostic spectrum of these patients was very similar in the different years. The number of cases included in the calculations stratified for disease duration and for education was reduced because of missing information for some patients.

Assessments. Standard forms are used for data recording. The variables from the self-administered patient questionnaire considered in these analyses are age, place of residence, formal education, and current employment status. Since 1996 fulltime and part-time employment have been differentiated.

The physicians record the diagnoses according to the American College of Rheumatology criteria for RA and SLE and the New York criteria for AS, onset of disease, previous and current therapy, activity [Disease Activity Score (DAS-28)], and severity of disease (5-item Likert scale).

Statistics. Standardization procedures established in morbidity and mortality analyses[28] were used to compare the employment rates between the different inflammatory rheumatic diseases. Population data from the annual interview survey of a representative sample of 1% of all households in Germany were obtained from the Federal Statistical Office for each year under consideration[29]. Although both parts of Germany were reunified in 1989, remarkable differences of employment remained. The unemployment rates over all age groups during the years of the study were 14% to 18% in the new federal states (NFS, formerly German Democratic Republic) compared to 9% to 11% in the old federal states (OFS, formerly Federal Republic of Germany)[30]. Therefore, most of the analyses were performed separately for the OFS and NFS.

The expected numbers of patients with gainful employment were calculated for men and women separately by means of indirect standardization for age (using 5-year age groups), place of residence (OFS, NFS), duration of school education, and year of documentation (1993-2001). This was done for each disease group in total as well as for subgroups according to disease duration (≤ 5 yrs, 6–10 yrs, > 10 yrs), for place of residence (OFS, NFS), and for duration of school education dichotomized at ≤ 9 years. Standardized employment ratios (SER) with 95% confidence intervals (95% CI) were calculated as the ratios of observed and expected number of patients employed. If a SER of 1 is included in the interval, this implies that the difference between the patients and the general population is not statistically significant at the 0.05 alpha level. Within strata the SER were compared by chi-square tests given for standardized mortality ratios[28]. The Bonferroni-Holm procedure[31] was applied to adjust the p values for multiple comparisons in each table.

To compare the SER of the diseases on a multivariate level (after adjustment for the risk factors sex, region of residence, education) Poisson regression was applied. In this model the relative increase (or decrease) in the SER is estimated by adjusted relative risks > 1 (or < 1). Different results for patients with disease duration < 5 years and those with long-lasting disease (> 10 years) were expected. Therefore, 2 multivariate Poisson regression models were calculated. The following reference groups for the estimated relative risks (RR) were used: RA for the comparison of the diseases, females for sex, OFS for region of residence, and > 9 years of school for education.

To assess the proportion of patients working part-time compared to the population, standardized part-time employment ratios (SPER) with 95% CI

were calculated similarly to the SER, forming the ratios of observed and expected number of patients working part-time. Due to small numbers, patients from the new federal states were omitted from the analyses of the SPER. SER and SPER were only calculated in subgroups of > 30 patients.

SPSS software was used for data entry and most of the analyses. LogXact version 5[32] was applied for computing the Poisson regression results.

RESULTS

Patients' characteristics. Large subgroups were available of patients with RA (n = 26,071), AS (n = 5564), PsA (n = 6041), SLE (n = 4603), SSc (n = 802), and WG (n = 385) (Table 1). The expected predominance of women was seen in RA, SLE, and SSc, whereas only 32% of AS patients were female. Due to the restriction in age at inclusion (20 to 59 years) the mean age ranged from 40 years in SLE to 48 years in RA. In accord with the distribution of the population (82% living in the OFS) the majority of the patients (78–87% in the various diagnoses) were recruited in the OFS. However, there were differences in years of school education between the disease groups and between patients from the OFS and NFS. Because of differences in the former school system there was a higher percentage of patients with more than 9 years of school education in the NFS. Further, patients with diseases with earlier onset (AS, SLE) had a higher education level than patients with RA. Adjusted for age, the odds ratio of having a higher education level was 1.1 ($p < 0.01$) for AS and SLE in comparison with RA, and 2.6 ($p < 0.001$) for patients from the NFS in comparison with the OFS. We therefore had to standardize employment ratios for the different factors (see *Statistics*). Nevertheless, conditions of healthcare were already equalized during the period reported here, and similar patient characteristics (disease severity, pain, function, treatment) were found in data from arthritis centers in the OFS and NFS (data not shown).

Differences of the SER between diseases. Significantly reduced SER were found in all diseases. The lowest SER of 0.76 to 0.81 were found for RA, SLE, SSc, and WG (Figure 1). In AS and PsA higher SER of 0.94 and 0.92, respectively, were calculated. Nevertheless, these summary figures do not reflect differences in disease duration, labor market conditions, or other risk factors. To take basic patient characteristics and the population background into account, patients were therefore stratified by sex, disease duration, and region of residence (Table 2).

In the OFS significant differences in SER between the various diseases were found. These differences remain significant after adjustment for multiple comparisons. Because of the lower number of patients, some of the differences did not reach significance in the NFS.

Influence of disease duration and labor market conditions. In most groups the SER were lower in the NFS compared to the OFS (Table 2). In all diseases the SER declined significantly with disease duration. In female RA patients the SER was 0.93 (95% CI 0.90–0.95) after ≤ 5 years of disease and declined to 0.56 (0.54–0.59) after > 10 years. In men with a disease duration > 10 years the decline in SER was lower than in women: 0.66 (0.62–0.71). No significant difference from the population was found in the SER in AS patients with a disease duration ≤ 10 years. In patients with longer-lasting AS the chance of employment was only about 0.9 times the chance in the general population: the SER were 0.88 (0.83–0.92) for men and 0.91 (0.84–0.99) for women with AS.

Men with PsA had no significant reduction in SER if they lived in the OFS. Women fared worse, with an overall SER of 0.88, due to a significant decline of SER after > 5 years of disease. In men living in the NFS an even larger decline of the SER was seen in long-lasting disease.

Table 1. Patients' characteristics (ages 20 to 59 yrs). Values are number of cases (percentages) or means ± SD.

	RA	AS	PsA	SLE	SSc	WG
No.	26,071 (100)	5,564 (100)	6,041 (100)	4,603 (100)	802 (100)	385 (100)
Women	20,267 (78)	1800 (32)	3,027 (50)	4,139 (90)	667 (83)	189 (49)
Age, yrs	48 ± 9	42 ± 11	45 ± 10	40 ± 11	47 ± 10	46 ± 11
Disease duration, yrs						
≤ 5	10,820 (42)	1,239 (23)	2,745 (47)	1,522 (34)	361 (48)	229 (61)
6–10	6,608 (26)	1,114 (21)	1,455 (25)	1,251 (28)	212 (28)	92 (24)
> 10	8,261 (32)	2,988 (56)	1,673 (28)	1,675 (38)	186 (25)	56 (15)
Place of residence						
Old federal states (OFS)	21,521 (83)	4,364 (78)	5,210 (86)	3,785 (82)	657 (82)	336 (87)
New federal states (NFS)	4,550 (17)	1,200 (22)	831 (14)	818 (18)	145 (18)	49 (13)
Years of education						
OFS: patients with ≤ 9 yrs	10,593 (53)	1,546 (38)	2,293 (46)	1,253 (35)	304 (51)	143 (45)
OFS: patients with ≥ 9 yrs	9,560 (47)	2,582 (63)	2,654 (54)	2,341 (65)	293 (49)	177 (55)
NFS: patients with ≤ 9 yrs	1,478 (34)	249 (21)	196 (24)	145 (18)	47 (34)	13 (27)
NFS: patients with ≥ 9 yrs	2,847 (66)	921 (79)	611 (76)	650 (82)	92 (66)	35 (73)
Total						
Patients with ≤ 9 yrs	12,071 (49)	1,795 (34)	2,489 (43)	1,398 (32)	351 (48)	156 (42)
Patients with > 9 yrs	12,407 (51)	3,503 (66)	3,265 (57)	2,991 (68)	385 (52)	212 (58)

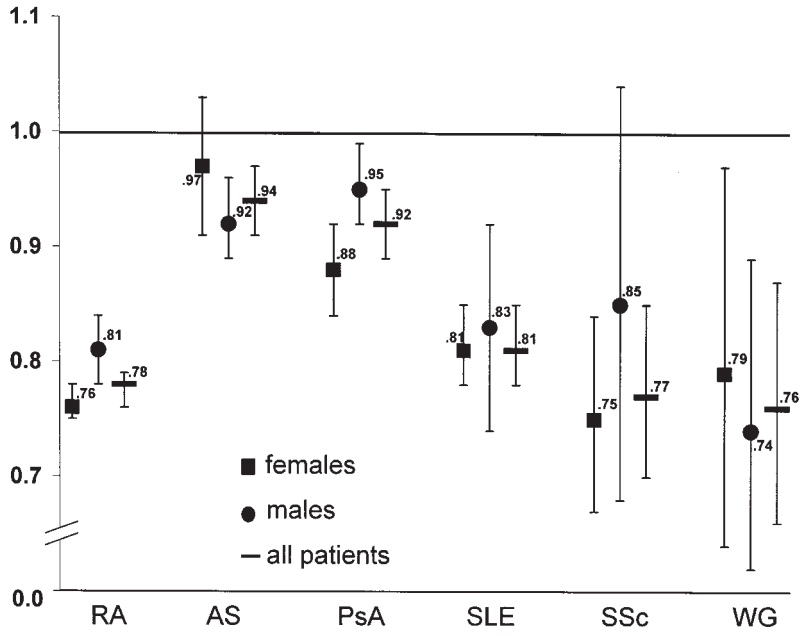

Figure 1. Standardized employment ratios (SER) of the patients in all German Collaborative Arthritis Centres.

Within the first 5 years of SLE the employment did not differ significantly from the general population. However, after 6–10 years a significant influence of disease on participation in the labor market was found in men and women in the OFS, and even more markedly in the NFS. In total the SER were 0.80 (0.74–0.87) and 0.68 (0.63–0.73) for women with a disease duration of 6–10 and > 10 years, respectively. For men the figures were 0.96 and 0.89, respectively.

In early SSc (≤ 5 years) a SER < 1 was observed in women and men in the OFS, but this difference from the general population was not significant. After > 10 years the influence of SSc on the employment of women was clearly significant in the OFS and in the NFS [in total SER of 0.58 (0.44–0.75)]. Of all patient groups with early disease the

Table 2. Standardized employment ratios (SER) (95% CI) of patients in the old and new federal states (OFS and NFS, respectively).

Sex/Disease Duration	RA OFS	RA NFS	AS OFS	AS NFS	PsA OFS	PsA NFS	SLE OFS	SLE NFS	SSc OFS	SSc NFS	WG OFS	WG NFS	p OFS	p NFS
Women														
≤ 5 yrs	**0.92*** **(0.89–0.95)**	0.95 (0.88–1.02)	1.06 (0.93–1.02)	1.09 (0.85–1.39)	0.94 (0.87–1.01)	0.98 (0.80–1.20)	0.97 (0.90–1.05)	0.91 (0.76–1.07)	0.89 (0.74–1.05)	0.84 (0.55–1.23)	0.79 (0.58–1.05)	NA	**0.006***	NS
6–10 yrs	**0.76** **(0.73–0.80)**	**0.70** **(0.63–0.78)**	1.02 (0.88–1.17)	0.97 (0.71–1.29)	**0.86** **(0.77–0.96)**	0.94 (0.73–1.20)	**0.83** **(0.76–0.90)**	**0.70** **(0.56–0.86)**	**0.71** **(0.54–0.90)**	NA	0.78 (0.44–1.26)	NA	**< 0.001***	**0.002***
> 10 yrs	**0.57** **(0.55–0.60)**	**0.53** **(0.48–0.58)**	0.91 (0.82–1.00)	0.93 (0.77–1.12)	**0.81** **(0.72–0.89)**	**0.77** **(0.62–0.95)**	**0.71** **(0.65–0.77)**	**0.53** **(0.43–0.65)**	**0.61** **(0.45–0.82)**	**0.44** **(0.19–0.86)**	NA	NA	**< 0.001***	**< 0.001***
All women	**0.78** **(0.76–0.79)**	**0.71** **(0.67–0.74)**	0.97 (0.90–1.03)	0.99 (0.87–1.12)	**0.88** **(0.83–0.92)**	**0.88** **(0.78–0.99)**	**0.84** **(0.80–0.87)**	**0.70** **(0.63–0.78)**	**0.77** **(0.67–0.87)**	**0.70** **(0.52–0.92)**	0.80 (0.63–1.00)	0.74 (0.38–1.30)	**< 0.001***	**< 0.001***
Men														
≤ 5 yrs	**0.91** **(0.87–0.96)**	**0.86** **(0.74–0.98)**	1.01 (0.93–1.09)	0.98 (0.78–1.20)	0.99 (0.93–1.05)	0.94 (0.77–1.14)	0.86 (0.70–1.04)	0.91 (0.57–1.39)	0.86 (0.62–1.15)	NA	0.82 (0.64–1.03)	NA	**0.002***	NS
6–10 yrs	**0.80** **(0.74–0.85)**	**0.75** **(0.62–0.91)**	0.98 (0.90–1.07)	0.91 (0.75–1.11)	0.97 (0.89–1.05)	0.91 (0.69–1.17)	**0.77** **(0.61–0.97)**	NA	NA	NA	0.75 (0.50–1.10)	NA	**< 0.001***	0.042
> 10 yrs	**0.68** **(0.63–0.73)**	**0.60** **(0.51–0.71)**	**0.89** **(0.84–0.95)**	**0.82** **(0.73–0.91)**	0.92 (0.84–1.01)	**0.70** **(0.54–0.89)**	0.86 (0.67–1.07)	NA	NA	NA	NA	NA	**< 0.001***	**0.001***
All men	**0.82** **(0.79–0.85)**	**0.74** **(0.67–0.81)**	**0.94** **(0.90–0.98)**	**0.86** **(0.78–0.93)**	0.97 (0.93–1.01)	**0.85** **(0.74–0.96)**	**0.83** **(0.73–0.94)**	0.81 (0.61–1.05)	0.84 (0.66–1.05)	0.90 (0.51–1.46)	**0.75** **(0.62–0.91)**	0.66 (0.33–1.18)	**< 0.001***	**0.008***

Significant values of SER with respect to the difference between patients and general population in bold print. NA: not applicable (calculation omitted due to small number of patients), p value for the comparison of disease groups. * p values remain significant after adjustment for multiple comparisons. NS: not significant.

lowest SER were observed in WG. However, as in the OFS only 98 women and 104 men with WG and a disease duration ≤ 5 years were observed, the differences from the general population were not statistically significant.

As could be expected, there was a strong influence of severity of disease on the chance of being employed; however, this did not explain the differences between the OFS and NFS. For women from the OFS with severe or very severe RA and a disease duration ≤ 5, > 5 to 10, and > 10 years the SER were 0.84, 0.59, and 0.37, respectively. The corresponding figures for patients from the NFS were 0.75, 0.30, and 0.20, respectively. Similar results were found for the other diseases, provided the subgroup was not too small (< 30).

Influence of education and labor market conditions. Highly significant differences in SER were found between patients with less (≤ 9 years) and more education in the OFS as well as the NFS (Table 3). In women with RA who had less education, very low SER were observed.

In women with AS a similar influence of education was found in each region of residence. Because of the lower number of patients from the NFS only the SER for the less educated women from the OFS reached statistical significance regarding comparison with the general population and with more highly educated women. However, in the case of much higher numbers of men the data of Table 3 suggest that low education and region of residence were 2 independent risk factors of a lower chance of being employed. Similar results as in AS were found in PsA patients with low education, with a strong influence on employment in men in the NFS (SER 0.62).

A strong influence of both region of residence and education level was also observed in women with SLE. In comparison with the general population the chance of labor market participation was reduced in women in the NFS with ≤ 9 years' education to roughly half. In the OFS the SER was also clearly lower. Similar combined effects of region of residence, education, and sex were thus observed in RA and SLE. Higher SER were seen in the OFS, in persons with more education, and in men.

Multivariate comparisons. We observed strong influences of sex, disease duration, education, and region of residence on employment rate across the various inflammatory rheumatic diseases. To estimate the relative importance of each of these factors after control for the other influences, we performed a multivariate Poisson regression analysis (Figure 2). Within each comparison, the first group (RA patients, female patients, patients from the OFS, patients with > 9 years of education) was used as the comparison group with a relative risk of 1. In early disease, there was a slightly higher chance of employment in AS and a lower rate in WG compared to RA. Across all diseases, the strongest influence was education. In patients with disease duration > 10 years, region of residence had an equally strong, independent influence on SER. As well, the differences between AS, RA, and WG became more pronounced. Female AS or PsA patients with > 10 years' disease duration had a RR of 1.64 and 1.41, respectively, in comparison with female RA patients with the same disease duration, whereas the figures for men were 1.25 and 1.14. Patients with WG had the worst outcome.

Part-time employment. In patients with RA as well as all other diseases, no difference to the population in respect to part-time employment was observed in women in the OFS (Table 4). The data for men are not shown because the sample sizes are too small (on average < 5% expected part-time work). In male RA patients no difference of observed and expected numbers of part-time workers was found. The same was seen in AS and PsA.

DISCUSSION

This study shows (1) increasing differences in labor force

Table 3. Standardized employment ratios (SER) (95% CI) pf patients in the old and the new federal states (OFS and NFS, respectively) by sex and education.

Sex/Disease	RA		AS		PsA		SLE		SSc		WG	
Duration	OFS	NFS	OFS	NFS	OFS	NFS	OFS	NFS	OFS	NFS	OFS	NFS
Women												
≤ 9 yrs	**0.70 (0.67–0.72)**	**0.55 (0.48–0.62)**	**0.86 (0.75–0.98)**	0.89 (0.59–1.29)	**0.82 (0.75–0.89)**	0.74 (0.52–1.03)	**0.70 (0.63–0.76)**	**0.47 (0.30–0.70)**	0.59 (0.47–0.74)	0.39 (0.14–0.85)	0.73 (0.48–1.08)	NA
> 9 yrs	**0.82 (0.80–0.85)**	**0.76 (0.72–0.80)**	0.98 (0.90–1.06)	0.98 (0.86–1.12)	**0.91 (0.85–0.97)**	0.91 (0.79–1.04)	**0.87 (0.82–0.92)**	**0.73 (0.65–0.82)**	0.90 (0.76–1.05)	0.80 (0.58–1.07)	0.81 (0.60–1.07)	NA
p	**< 0.001***	**< 0.001***	**< 0.001***	NS	**< 0.001***	0.01	**< 0.001***	**< 0.001***	**< 0.001***	0.016	NS	NA
Men												
≤ 9 yrs	**0.78 (0.75–0.82)**	**0.67 (0.56–0.80)**	**0.89 (0.83–0.95)**	**0.69 (0.53–0.87)**	**0.93 (0.87–0.99)**	**0.62 (0.41–0.89)**	**0.73 (0.59–0.88)**	NA	0.82 (0.59–1.12)	NA	0.65 (0.47–0.89)	NA
> 9 yrs	**0.88 (0.84–0.93)**	**0.78 (0.70–0.87)**	0.98 (0.93–1.04)	**0.89 (0.81–0.97)**	1.00 (0.94–1.06)	0.88 (0.76–1.01)	0.95 (0.80–1.11)	0.85 (0.63–1.13)	0.94 (0.63–1.34)	NA	0.84 (0.65–1.08)	NA
p	**< 0.001***	**< 0.001***	**0.002***	**0.001***	**0.003***	0.006	0.017	NA	NS	NA	0.09	NA

Significant SER with respect to the difference between patients and general population in bold print. NA: not applicable (calculation omitted due to small number of patients), p values for the comparison by education. NS: not significant. * p values remain significant after adjustment for multiple comparisons.

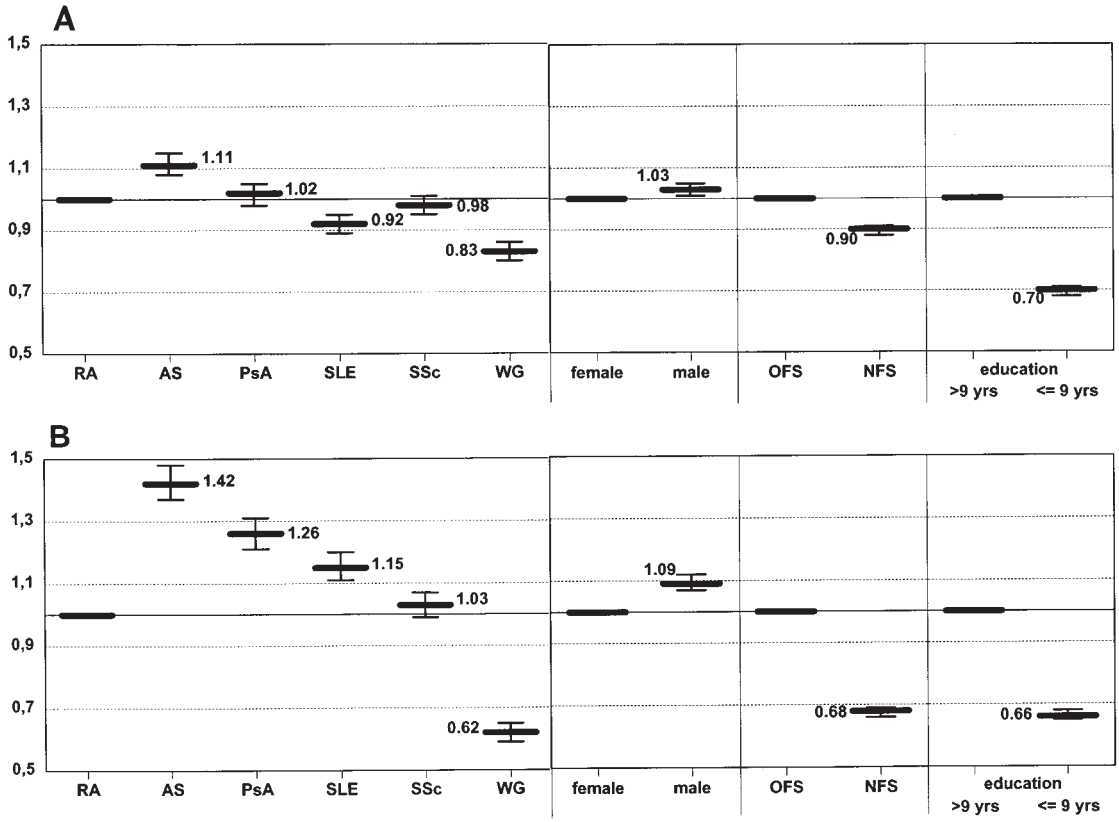

Figure 2. Relative risks (RR) of higher/lower SER by disease duration (reference groups are RA, women, higher education, OFS). A. Disease duration ≤ 5 years. B. Disease duration > 10 years.

Table 4. Observed number of women in the old federal states working fulltime and part-time, expected part-time employment, and standard part-time employment ratios (SPER) (data available only 1996 to 2001).

	RA	AS	PsA	SLE	SSc	WG
Observed full time work, n	2,333	252	446	602	67	26
Observed part-time work, n	2,062	189	420	403	67	21
Expected part-time work, n	2,063	193	401	410	63	22
SPER (95% CI)	1.00 (0.96–1.04)	0.98 (0.85–1.13)	1.05 (0.95–1.15)	0.98 (0.89–1.08)	1.06 (0.82–1.35)	NA

NA: not applicable (calculation omitted due to small number of patients).

participation across different inflammatory rheumatic diseases, including rare disorders, with increasing disease duration; and (2) the influence of educational status and labor market conditions on employment across patient groups and in comparison with the general population. The influence of labor market conditions and education status on employment was described for patients with RA and AS with the 1993 to 1997 dataset[23]. Now these findings based on crude comparisons are confirmed after standardization for important risk factors.

Within the first 5 years of RA only a small reduction of the employment ratio was found. This confirms results from a Dutch study that considered the population background by means of a similar standardization procedure[33]. Clinical studies not considering the population background reported work disability rates of up to 42% in this period[2,5-8,12,34,35].

In previous studies different approaches were chosen to estimate the excess risk of work loss in patients with RA and (rarely) in other chronic inflammatory rheumatic diseases. High proportions of work loss *per se* have been interpreted as an indication that the disease is at least the main cause. This assumption may be questioned, particularly in countries with high unemployment rates. Controlling for other risk factors of work loss may explain the only moderately

reduced labor force participation in patients with early RA in our study and the Dutch study[33]. However, as in the latter study, the unfavorable effect of RA increased with disease duration in our patients. The effect of RA on labor force participation was stronger in our data than in the Dutch study. This can be explained by the low unemployment rates in The Netherlands. We found that the general employment rate is a strong predictor of labor force participation in rheumatic diseases.

On the other hand, a more supportive system and the possible incentive to withdraw from the labor force may explain the lower employment rates reported for AS patients in The Netherlands compared to other European countries and to our data[36]. This may particularly contribute to the significant reduction of employment in early AS in The Netherlands, with no further increase after 10 years of disease[24], which is in contrast to the present study. Compared to patients in the other disease groups the reduction of employment with increasing disease duration is less pronounced in AS. Considering the large sample size, statistical significance is reached in men after a disease duration of more than 10 years. The comparatively high employment in AS patients even with long-lasting disease or higher age is in accord with other studies[7,14-17].

Compared to the more favorable employment rates in patients with AS, individuals with SSc and WG showed reduced participation in the labor force similar to individuals with RA. The high reduction of employment in those with WG within the first 5 years corresponds to data in 2 recent reports[19,22].

In contrast to 2 studies of SLE patients without reference to population data that report work disability in about 40% of patients after a mean duration of 3.4 and 5.5 years[20,21], our data show significantly reduced employment rates only after at least 6 years of disease.

Reduced working hours have been reported by other investigators across different diseases[17,19,20,24,35,37,38]. However, our study showed no increased part-time employment in women or men. In Germany only a limited number of part-time jobs are available, particularly for men. The reluctance of employers to offer this kind of job may contribute to the lack of adjustment of working time in patients with chronic rheumatic diseases in our country. This might change in the future: since January 2001 work disability pensions can be paid as either fulltime or part-time pension. The employee with partial work disability has the right to work part-time with his previous employer. Future followup of patients in the database will show how frequently patients make use of this new possibility.

Although analysis of the full range of work disability indicators was not the purpose of this study, the stratification of SER for selected risk factors provides valuable information on their combined effects. One of the advantages of the German National Database is the chance to analyze the influence of the labor market assessed by region of residence. If the overall unemployment rate in the population is high, as seen in the NFS, risk factors for withdrawal from the labor force such as longer disease duration and low education become more important. Education may be a surrogate marker for type of work, income, and self-management abilities. Our data confirm the significance of education reported by others[2,5,17,20,33,39-42]. The negative effect of labor market conditions could only be observed because there were major differences in unemployment rates between the NFS and the OFS of 6% to 10% in the years under observation. The small changes in employment rates observed in the OFS between 1993 and 2001 had no significant influence on the employment of RA patients compared to the population.

This study has some limitations. First, since patients were recruited by rheumatologists, they can be expected to be more severely affected by the disease and by work loss than cases in the general population. On the other hand, we lost those patients who could not attend the rheumatologist due to immobility or death. Therefore, generalization of the results is limited to patients treated by rheumatologic specialists.

Second, the upper age limit of 59 years omitting older patients up to the retirement age of 65 years in men and 63 or 64 years (depending on year of birth) in women may lead to more favorable employment rates in this study compared to reports that included older patient populations. We decided to exclude patients aged 60 years or older because individuals of this age group in the general population show a marked increase of early retirement, making the attribution of work loss to rheumatic disease less reliable. In the years under observation in the German population only 31.6% of men and 10.7% of women aged 60 to 64 were still working. In an earlier report[8] we identified an age cutoff for increased risk of work disability of 50 years, which is well below the upper age limit in this study. The association of risk profiles with younger age was pointed out by a recent study from Norway[40]. Finally, we did not address the influence of rheumatic diseases on work life in a wider sense, and did not consider factors such as sick leave and reduced income reported by other investigators[1,5,6,19].

Consideration of the population background and a comparison between the diseases under study showed the impact of various inflammatory rheumatic conditions and of selected additional risk factors on being employed. Specific measures to prevent patients with rheumatic diseases from losing their jobs, including adaptations of the workplace, working conditions, or working hours, seem to be required, especially in areas with overall high unemployment rates.

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