CONCISE REPORT

Predictors of productivity loss in early rheumatoid arthritis: a 5 year follow up study

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Objective: To explore baseline risk factors for productivity loss and work disability over 5 years in patients with early, active RA.

Patients and methods: In the FIN-RACo trial, 195 patients with recent onset RA were randomised to receive either a combination of DMARDs with prednisolone or a single DMARD for 2 years. At baseline, 162 patients were working or available for work. After 5 years' follow up, data on sick leave and retirement were obtained from social insurance registers or case records. The cumulative duration of sick leaves and RA related disability pensions was counted for each patient. To analyse predictors of productivity loss, the patients were divided into four groups according to duration of work disability per patient year.

Results: Patient's and physician's global assessment of RA severity ⩾50 and HAQ score ⩾1.0 were risk factors for extension of productivity loss (OR (95% (CI) 1.77 (1.00 to 3.16), 1.85 (1.03 to 3.32), and 1.78 (1.01 to 3.14), respectively). Additional risk factors were low education level (2.40 (1.18 to 4.88)) and older age (1.03 (1.00 to 1.06)); combination treatment was a protective factor (0.59 (0.35 to 0.99)).

Conclusion: At baseline, the risk of future productivity loss is best predicted by education level, age, global assessments of RA severity, and HAQ score.

Work disability is a common and the most expensive consequence of rheumatoid arthritis (RA), resulting in lost income for the patient and less productivity for society.[1 2] Working ability is a multifactorial phenomenon depending, in the first place, on the balance between personal factors—physiological capacity, psychological characteristics, professional and social skills—and work requirements. Ample evidence indicates that physically demanding jobs, lower educational level, older age, and longer duration plus severity of RA raise the risk of work disability.[3–5]

Most studies have used the pre-term RA related disability pension as the sole indicator of work disability. We have recently proposed a more sensitive and accurate measure: the cumulative number of work disability days per patient-observation year.[6] In addition, this variable is proportionate to lost productivity. By applying this measure as an outcome in recent onset RA, we have been able to report that initial aggressive treatment with a combination of disease modifying antirheumatic drugs (DMARDs), compared with treatment with a single DMARD, reduces lost work days and saves costs to society.[6]

Prediction of each patient's future ability to earn a living is of utmost importance both for the individual and for society. In this study we analyse the baseline predictors of (*a*) cumulative work disability per patient-observation year—that is, lost productivity, and (*b*) RA related permanent disability pension.

PATIENTS AND METHODS

From April 1993 to May 1995, 195 DMARD-naïve patients with recent onset (disease duration <2 years), clinically active RA were included in a multicentre, parallel group study comparing treatment with a combination of DMARDs with that of a single DMARD. For the first 2 years the patients received either a combination of sulfasalazine, methotrexate, hydroxychloroquine, and prednisolone or a single DMARD (initially sulfasalazine) with or without prednisolone. After 2 years, the choice of drug treatment became unrestricted, and 48 patients in the single treatment arm underwent treatment with a combination of DMARDs. Patients were assessed clinically at the beginning of the study and at follow up visits for 5 years. Radiographs of the hands and the feet were assessed by one radiologist. The study has been described in detail previously.[6 7]

At entry, 162 patients (80 receiving combination treatment; 82 receiving single treatment) were working or available for work. At the 5 year follow up visit, the patients filled out a questionnaire. Data derived included among other things formal education level and employment status since study entry. Further, the patients were asked for permission to access data on their sick leaves and pensions from the social insurance registers. The principles of the Finnish social insurance system have been described elsewhere.[6] A total of 146 patients gave their written permission. For the remaining 16 patients, based on the informed consent at baseline, information about sick leave and retirement was obtained from case records. For each patient, the cumulative duration was calculated for sick leaves and RA related disability pensions. The number of each patient's work disability days was divided by the observation period (years) during which the patient was not retired owing to other diseases or because of age (without taking RA into account). This period of time ranged from 0.5 to 5 years (mean 4.7). The median duration of work disability per patient-observation year was 23 days (interquartile range 0–158). During the 5 year follow up, 40 patients became prematurely retired on permanent disability pensions due to RA.[6]

Statistical analysis

The patient's and physician's global assessments (scale 0–100) were dichotomised at 50 (the median rounded to the nearest 10). The self reported function (Health

Abbreviations: CI, confidence interval; DMARD, disease modifying antirheumatic drug; ESR, erythrocyte sedimentation rate; HAQ, Health Assessment Questionnaire; HR, hazard ratio; OR, odds ratio; RA, rheumatoid arthritis

Table 1 Baseline predictors of work disability days per patient-observation year (continuation ratio logistic model; dependent variable is made up of four ordinal levels: 0 days, 1–19 days, 20–149 days, and 150–365 days) and for RA related disability pensions (Cox's proportional hazard regression model) in a 5 year follow up of 162 patients with RA

Variable at start of the study	Work disability days				RA related disability pensions			
	Univariate		Multivariate*		Univariate		Multivariate*	
	OR (95% CI†)	p Value	OR (95% CI†)	p Value	HR (95% CI†)	p Value	HR (95% CI†)	p Value
Male	0.79 (0.50 to 1.26)	0.33			0.87 (0.45 to 1.67)	0.68		
Age (years)	1.06 (1.03 to 1.08)	<0.001	1.03 (1.00 to 1.06)	0.050	1.12 (1.06 to 1.17)	<0.001	1.13 (1.08 to 1.19)	<0.001
Education (years):		<0.001		0.016		0.034		
0–9	2.86 (1.54 to 5.31)		2.40 (1.18 to 4.88)		3.02 (1.14 to 8.00)			
10–13	1.42 (0.73 to 2.76)		1.58 (0.78 to 3.19)		1.40 (0.44 to 4.41)			
⩾14	Reference				Reference			
"Blue collar" profession	1.57 (1.00 to 2.46)	0.052			1.66 (0.87 to 3.14)	0.12		
Delay to treatment (>4 months)	0.81 (0.50 to 1.39)	0.39			0.89 (0.46 to 1.73)	0.74		
Rheumatoid factor present	1.10 (0.67 to 1.79)	0.72			1.66 (0.77 to 3.61)	0.20		
Swollen joint count	1.01 (0.98 to 1.05)	0.49			1.00 (0.96 to 1.05)	0.94		
Tender joint count	1.03 (1.00 to 1.06)	0.031			1.02 (0.99 to 1.05)	0.16		
Global assessment:								
Patient's assessment ⩾50	1.86 (1.18 to 2.94)	0.008	1.77 (1.00 to 3.16)	0.049	2.33 (1.23 to 4.43)	0.010	2.07 (1.05 to 4.09)	0.035
Physician's assessment ⩾50	2.38 (1.48 to 3.82)	<0.001	1.85 (1.03 to 3.32)	0.041	2.10 (1.13 to 3.88)	0.019		
ESR (mm/1st h)	1.01 (1.00 to 1.02)	0.028			1.01 (1.00 to 1.02)	0.19		
Erosive	0.70 (0.44 to 1.10)	0.12			0.71 (0.37 to 1.36)	0.30		
HAQ score ⩾1.0	1.96 (1.23 to 3.11)	0.005	1.78 (1.01 to 3.14)	0.046	2.09 (1.12 to 3.91)	0.020	2.04 (1.09 to 3.82)	0.026
Combination treatment	0.55 (0.35 to 0.87)	0.01	0.59 (0.35 to 0.99)	0.047	0.64 (0.34 to 1.21)	0.17		

*Forward stepwise method. Only entered variables shown; †with robust estimator of variance.

Assessment Questionnaire (HAQ) score) was dichotomised at 1.0. In the analysis of the predictors of work disability days, the patients were divided into four categories according to the cumulative duration of work incapacity per patient-observation year: (*a*) 0 days (n = 41); (*b*) 1–19 days (38); (*c*) 20–149 days (42); and (*d*) 150–365 days (41). A continuation ratio logistic model for ordinal response data[8] was used; the forward stepwise method was used in the multivariate analysis. The linearity of trend was analysed by Cuzick's test.[9] Cox's proportion of hazards model with a robust estimator of variance was used to analyse the predictors of permanent RA related disability pensions. Associations are summarised as odds ratios (ORs) and hazard ratios (HRs) with 95% confidence intervals (95% CI).

RESULTS

Predictors of cumulative work disability per patient observation year

In univariate analysis, the initial combination treatment was protective against extension of work disability (table 1). On the other hand, older age, low education level (<10 years), and high scores (⩾50) in patient's and physician's global assessments of the severity of RA, tender joint count, erythrocyte sedimentation rate (ESR), and self reported disability (HAQ score ⩾1.0) were risk factors. A physically demanding job did not quite reach statistical significance as a risk factor.

In the forward stepwise multivariate model, patient's and physician's global assessments, HAQ, low education level,

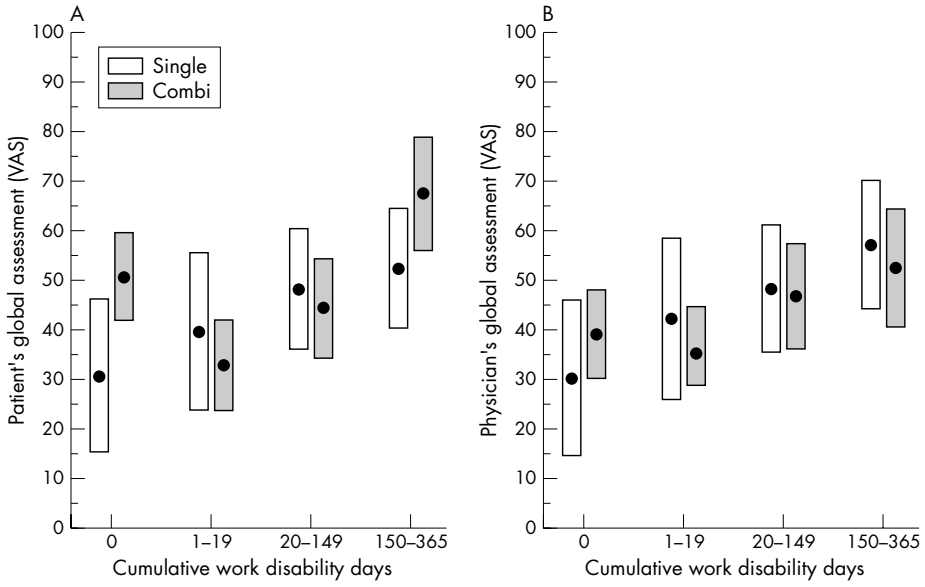

Figure 1 Association of work disability category with patient's and physician's global assessment of the severity of RA at baseline. Age and sex adjusted medians (●) with 95% CIs.

and age remained significant risk factors; the initial combination treatment was still protective. A linear trend was observable between the work disability categories and the patient's global ($p = 0.001$) or the physician's global assessment ($p<0.001$) (fig 1), especially in the single treatment arm.

Predictors of permanent RA related disability pension

In univariate analysis, older age, low education level, patient's and physician's global assessments ⩾50, and HAQ disability were statistically significant predictors (table 1). However, only patient's global assessment, HAQ, and age retained statistical significance in multivariate analysis.

DISCUSSION

In this controlled, prospective 5 year study of patients with recent onset active RA, we show that low education level, older age, and high scores in HAQ and in patient's and physician's global assessment of RA severity at baseline predicted longer duration work disability and, consequently, greater losses of productivity. On the other hand, initial aggressive treatment with a combination of DMARDs protected against extension of work disability, confirming the results of our previous paper.[6] The linearity of trend between the work disability categories and the global assessments at baseline (fig 1) was less pronounced in the combination treatment group, suggesting that aggressive initial treatment can lead to a favourable outcome despite ominous prognostic factors. The treatment type showed no statistically significant effect on disability pensions.

Our results to some extent parallel those of other prospective studies of RA related permanent work disability.[3–5] Low formal education level has been associated with work disability in most studies in which this variable has been available. Fewer years of schooling often result in a physically demanding occupation with fewer possibilities for vocational rehabilitation.

Few studies of RA related work disability have measured the patient's or physician's global assessment of RA severity,[3 5] although these variables have appeared to be the measures most sensitive to change in clinical trials of RA[10] and as predictors of future disability.[11] The global measures, which are either subjective (patient's global) or semiobjective (physician's global assessment), represent a type of sum indicator reflecting not merely the physiological characteristics of the patient.

The HAQ disability, another self reported patient measure, has been a correlate of permanent work disability in almost all studies.[3–5] In this study an HAQ score ⩾1 was a significant independent risk factor for cumulative work disability and for RA related disability pension. The global variables and HAQ were far better predictors than the traditional indicators of inflammation (swollen joints, ESR, etc) or of tissue damage (erosions). Pincus *et al* have also recently shown the value of the patient questionnaire data.[12]

Some studies have shown that in patients with RA, the social and work related factors have a larger impact on permanent work disability than factors involving the disease itself.[13] Occupational heavy labour has been associated with RA related permanent work disability in most if not all studies in which it has been analysed.[3–5] In our study, however, a physically demanding job was not a statistically significant risk factor. All studies have used social class or job title as the indicator of heavy labour. Obviously, these are very crude correlates of the actual physical work load.

In agreement with previous studies, older age was a predictor of permanent work disability, and in this study also of productivity loss during the 5 year follow up. Elderly people tend to have a less favourable course of RA.[14] Further, aging has many potential direct effects on working ability. Performance capacity decreases with age, and long life brings with it debilitating disorders and diseases.[15] Older people are, on average, less well educated and have fewer chances for successful vocational rehabilitation. In addition, employers may be reluctant to employ older people. However, young patients, with more potential working years left, naturally are at risk of higher individual losses when losing their working capacity.

In summary, the global assessments and the HAQ were the only RA related baseline variables predicting productivity loss and permanent work disability. These questionnaire measures are simple and easy to use routinely in clinical practice. High scores should be regarded as alarm signals for poor outcome, more lost work days, and high cost to society. This may help in choosing the right treatment—that is, one which is aggressive enough, for the right patient from the start.

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