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Work productivity in a population based cohort of patients with Spondyloarthritis

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Short title: Work productivity in SpA patients

Key words: Spondyloarthritis, work productivity, presenteeism, absenteeism, patient reported outcomes

Objective: To assess work productivity and associated factors in patients with spondyloarthritis (SpA).

Methods: This cross-sectional postal survey included 1,773 patients with SpA identified in a regional healthcare register. Items on presenteeism (reduced productivity at work, 0-100%, 0 = no reduction) were answered by 1,447 individuals. Absenteeism was defined as register based sick leave using data from a national register. Disease duration, disease activity (BASDAI), physical function (BASFI), health-related quality of life (EQ-5D), anxiety (HAD-a), depression (HAD-d), self-efficacy (ASES pain and symptom), physical activity and education were also measured.

Results: Forty-five percent reported reduced productivity at work with a mean reduction of 20% (95% CI 18-21) were women reported higher mean reduction than men (mean 23% vs. 17%, $p<0.001$). Worse quality of life, disease activity, physical function and anxiety all correlated with reduced productivity ($r= 0.52-0.66$, $p <0.001$), while sick leave did not. Worse outcomes on the EQ-5D (β-est -9.6, $p<0.001$), BASDAI (β-est 7.8, $p<0.001$), BASFI (β-est 7.3, $p<0.001$), ASES pain (β-est -0.5, $p<0.001$) and HAD-d (β-est 3.4, $p<0.001$) were associated with reduced productivity at work in patients with SpA regardless of age, gender and disease subgroup. ASES symptoms, HAD-a and education level <12 years were associated with reduced productivity but were not significant in all strata for age, gender and disease subgroup.

Conclusion: Work productivity was reduced in patients with SpA and more so in women. Worse quality of life, disease activity, physical function, self-efficacy and depression were all associated with reduced productivity at work in patients with SpA.

Introduction

Spondyloarthritis (SpA) can cause impaired function, activity limitations, decreased health related quality of life (HRQoL), increased risk for comorbidities and negatively affects individuals throughout their working careers causing work disability and generating increased costs both for the individual and society [1-8].

Work productivity includes both absenteeism (measured as sick-leave) and presenteeism reflecting reduced productivity at work often measured as the degree of impairment while at work. An increase in sick leave, work disability, higher health care consumption, more prescribed medications but also reduced productivity at work has been reported in ankylosing spondylitis (AS) [1, 4, 5, 9-11]. The aim of this study was to evaluate work productivity, to compare differences between genders and among different subgroups of SpA and to evaluate what factors that were associated with reduced productivity at work in patients with SpA.

Methods

This cross-sectional study was based on a questionnaire survey in south Sweden between May and August 2009. The patients were identified by the Skane Health Care Register (SHCR) that contains information on the healthcare provider, date of visit and the International Classification of Diseases (ICD-10) codes as diagnosed by physicians. Additional register data on sick leave were obtained from the Swedish Social Insurance Agency (SSIA). Using the SHCR, all subjects who at any time in 2003-2007 received an ICD-10 diagnosis of SpA including the subgroup ankylosing spondylitis (AS), psoriatic arthritis (PsA), or USpA (both undifferentiated SpA and inflammatory arthritis associated with inflammatory bowel disease) were identified and mailed a questionnaire. More details on the SHCR [7, 12, 13] and the

questionnaire have been published elsewhere [14]. All individuals 18-67 years-of-age were eligible to participate.

Presenteeism One initial question assessed work impairment in the previous seven days (yes or no). Reduced productivity at work was measured by the question “During the past seven days, how much did SpA affect your productivity while you were working?” from the disease generic instrument Work Productivity and Activity Impairment Questionnaire for patients with AS (WPAI-SpA). The question measures the degree of impairment and patients rated the percentage of reduced productivity on a numeric rating scale (0-100%) where a higher percentage indicated a greater reduction [15-17]. Patients who responded “no” to the initial question were not asked to rate the degree of reduction but were included in the analysis with 0% reduction of productivity.

Additional measures Included patient characteristics (age, sex and ICD-10 diagnoses) were collected from the SHCR while disease duration was self-reported. Disease severity and physical function was measured by the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) [18] and Functional Index (BASFI) [19, 20] and was collected together with pain and fatigue measured with numerical rating scales (0-10, best to worst). The EuroQol (EQ-5D) was used to assess health-related quality of life ranging from 0-1 (0=worst health to 1=full health) [21]. Information on physical activity was derived from three questions based on the WHO “Global recommendations of physical activity for health” [22, 23]. Psychological status was measured with the Hospital Anxiety and Depression scale for anxiety (HADa) and depression (HADd) (0-21, no distress to maximum distress) [24]. Self-efficacy to cope with consequences of the disease was measured with the Arthritis Self-efficacy Scale (ASES) with subscales for pain (5 items) and other symptoms (6 items) scored on a scale of 10-100 (higher scores correspond to greater self-efficacy) [25]. To improve face

and content validity, the whole questionnaire was tested in focus groups consisting of in total twenty patients with different SpA subgroups. This resulted in minor corrections to improve patients´ understanding [14].

Sick leave data. The first period of sick leave (<14 days) is paid directly by the employer and the rest from SSIA and therefore only sick leave periods exceeding 14 days are included in these analyses. The data includes the number of days with sickness benefits and disability pension related to SpA as well as to other diagnoses presented as net days in a 3 month period (0-91 days) and expressed as the number of net days with sick leave [5].

Statistical analysis. All analyses were performed using SPSS for Windows v. 17. Patient characteristics were described with means, standard deviations and 95% CI. T-tests and ANOVAs were used for group comparisons. Pearson correlation coefficient tests were used to study correlations between productivity at work and other variables. An acceptable correlation was considered as >0.5, arbitrarily chosen. To study factors associated with reduced productivity the univariate analysis ANOVA was used yielding B-est (estimate of the true coefficient in the population, based on a sample from the population). The analyses were also presented separately in twelve different subgroups; by gender, age and SpA subgroups (AS, PsA and USpA) significance level < 0.05.

Ethics. The Regional Ethical Review Board at Lund University, Sweden approved the study (301/2007, 406/2008). Informed consent was obtained in compliance with the Helsinki Declaration.

Results

2,851/3,711 (76%) patients with SpA who received the questionnaire responded: 648 (18%) declined participation and 2,167 (58%) completed the questionnaire. 1,045 were men with mean age 56 yrs (SD 13) and 1,122 were women with mean age 55 yrs (14). The 1,773 (48% men) individuals at working age (18-67 years) were included in the analyses (Table 1). Analysis of non-responders (n=1544/3711, mean age 52 years, female/male 772/772) showed that patients with AS were more likely to respond to the questionnaire and that patients with SpA associated with inflammatory bowel disease were the least likely to respond. Higher age also significantly predicted a higher response rate in men whereas women tended to respond more with higher age as well except in the subgroup AS.

Self-reported presenteeism. The question concerning reduced productivity at work was answered by 1,447 patients: 802 (55%) reported no reduction in productivity. For those who reported reduced productivity, the mean reduction was 20% (95% CI 18-21). Women reported statistically significant higher degree of reduced productivity at work (mean reduction 23% vs. 17%, $p<0.001$) but no statistically significant differences were found between the SpA subgroups AS, PsA and USpA ($p=0.174$) (Table 1).

Register based sick leave as a measure of absenteeism. Sick leave (absenteeism $\geq$ 14 days) ranged from 0-91 days per three months with mean 19 days (95% CI 17-20). A large proportion, 72%, had no sick leave. The remaining patients, 28% (n=504/1773), had mean net days = 66 (95% CI 63-68). Fifteen percent (n=263/1773) had full register based sick leave (absenteeism $\geq$ 91 days/three months).

Correlations between presenteeism and possible associated factors. The variables health-related quality of life (EQ-5D), disease activity (BASDAI), physical function (BASFI) and anxiety (HADa) were all significantly correlated with reduced productivity at work in patients

with SpA (r=0.52-0.66, p=<0.001). No significant correlations were found between reduced productivity at work and age, self-efficacy (ASES), depression (HADd), disease duration or sick leave (absenteeism).

Associations with presenteeism Patients with worse disease activity (BASDAI) (β-est 7.8, p<0.001), impaired physical function (BASFI) (β-est 7.3, p<0.001) and health-related quality of life (EQ-5D) (β-est -9.6, p<0.001) were associated with reduced productivity at work and there were no major differences regarding these associations in various strata for age, gender or disease subgroups (see Table 2 for the entire SpA sample). Data for the subgroups are presented in Table 3. A β-est by 7.8 means that the productivity is reduced with 7.8% when the BASDAI score increases by 1 step.

Patients with lower self-efficacy in the ASES pain and symptom scale (β-est -0.5, p<0.001), higher anxiety scores (HADa) (β-est 2.3, p<0.001) or higher depression scores (HADd) (β-est 3.4, p<0.001) also reported reduced productivity at work (Table 2). When stratifying for age, gender and disease subgroups only marginal differences were found. Lower self-efficacy (ASES pain) and higher degree of depression (HADd) were associated with reduced productivity in all strata. Lower self-efficacy (ASES symptom) was associated with reduced productivity in all strata except for the older group of women with AS. A higher degree of anxiety (HADa) was associated with reduced productivity in all strata except for the older groups of men and women with USpA (Table 3).

Disease duration was associated with reduced productivity at work in strata for the older group of men (β-est -0.6, p=0.020) and younger group of women with AS (β-est -1.5, p=0.002) (Table 3). To have an educational level less than 12 years was associated with reduced productivity in patients with SpA (β-est 3.9, p=0.013) (Table 2) also in strata for the older group of men with AS (β-est 11.5, p=0.044) and the younger group of women with PsA

(β-est 10.1, p=0.011) compared with those with education level above 12 years. Women with USpA not meeting the recommendations of physical activity were associated with reduced productivity compared with those who met the recommendations of physical activity (β-est 13.4, p=0.018 in the younger group, β-est 17.6, p=0.038 in the older group) (Table 3).

Discussion

Our study showed that a large number of patients with SpA experienced a reduction in productivity at work. It was more common for women while no significant differences between disease subgroups were found. Worse quality of life, higher disease activity, lower physical function, lower self-efficacy pain or higher depression scores were all associated with reduced productivity regardless of age, gender or disease subgroup.

The rather high prevalence of SpA [13] and the early disease onset makes it important to understand the disease impact on work productivity. The Outcome Measures in Rheumatology (OMERACT) has also suggested productivity to be used as an outcome measure in clinical trials in arthritis patients [26]. Patients with musculoskeletal pain conditions, arthritis and AS are associated with a significant burden in the workforce [9, 11, 26-36]. We found 45% of the individuals with SpA reported reduced productivity which is in line with former reports on individuals with arthritis (44%) [37] but less than in patients with AS (53%) [9]. We also found that women reported more reduced productivity which may be related to worse self-reported function and higher disease activity known to affect the work productivity [11, 32].

The negative impact of AS on absenteeism has formerly been investigated and data seem consistent although it is difficult to generalize the results due to differences in social security systems in the countries studied [5, 9, 10, 31-33]. In the present study absenteeism seems to be affected even when studying the whole spectrum of SpA patients. In our study we found no correlations between reduced productivity at work and sick-leave. The absence of correlation may be related to different assessment methods for absenteeism and presenteeism, where productivity at work was measured over 1 week by a questionnaire and absenteeism measured

over 3 months by a register. Not being able to include periods of sick-leave <14 days in the present analyses could further contribute to the lack of correlation. As no correlations were found between reduced productivity at work and sick-leave, we solely are analyzing productivity while at work further in this analysis.

The current study provides evidence for an association between reduced productivity at work and patient-reported outcomes reflecting disease activity, physical function, health related quality of life, self-efficacy, anxiety and depression. Previous findings have also reported comparable associations in patients with AS [9, 11, 32, 38, 39]. Furthermore, aging [11] and pain [32] have been found associated with reduced productivity in patient with AS which is now also confirmed in this study for the whole SpA group.

A strength of this study is that patients were included from both specialist and primary health care, the large sample sizes which enables us to study detailed strata for gender, age and SpA subgroups. One limitation may be that non-responders could introduce response bias and affect the generalizability [14]. Our response rate was however similar to other questionnaire based population studies [11, 33]. Another limitation may be to use the productivity question separated from the complete WPAI – questionnaire even if the use were preceded by a face- and content validation procedure [14]. Extracting this question from a wider workforce perspective could affect the results [40]. Despite this, the results had good agreement with studies conducted on patients with AS. For future studies aspects on e.g. education, physical activity and anxiety influencing presenteeism, in comparison to healthy individuals, should be included.

Our results thus indicate that work productivity is reduced in all subgroups of SpA. Women reported more reduced productivity at work and several patient-reported variables were associated with reduced productivity in patients with SpA. This information can be used to provide individualized coaching in clinical practice. By using relatively simple self-reported instrument on disease activity, function, health-related quality of life, self-efficacy and mental health status, health care providers can find indications of patients at risk for reduced productivity at work.

Key message

- Just under half of the patients with spondyloarthritis, reported reduced productivity at work.
- Women reported more reduced productivity at work than men.
- Quality of life, disease activity, physical function, self-efficacy and depression were associated with productivity.

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Conflict of interest statement

E.H has received fees for speaking from Abbott and Roche. A.B has acted as consultant for Abbott. S.B has received fees for speaking from Pfizer. L.T.H.J has acted as consultant for Pfizer, Abbott, BMS, MSD and UCB and I.F.P has received fees for speaking from Pfizer, Abbott and UCB Pharma.

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Table 1. Demographics and characteristics for the study population in total, by gender and different spondyloarthritis subgroups

	SpA total	Women	Men	AS	PsA	USpA
Number	1773	925	848	477	931	365
Gender, men	48%			64%	43%	40%
Age (yrs)[a]	51 (12)	51 (12)	52 (11)	51 (11)	53 (11)	47 (11)
Disease duration (yrs)[a]	13 (10)	11 (9)	14 (11)	18 (12)	11 (9)	10 (8)
EQ-5D (0-1)[a]	0.75 (0.16)	0.74 (0.16)	0.76 (0.17)	0.76 (0.17)	0.75 (0.16)	0.75 (0.17)
BASDAI (0-10)[a]	4.4 (2.2)	4.7 (2.1)	4.0 (2.2)	3.9 (2.3)	4.8 (2.1)	4.3 (2.2)
BASFI (0-10)[a]	3.0 (2.4)	3.4 (2.5)	2.6 (2.3)	3.1 (2.5)	2.9 (2.5)	2.9 (2.3)
ASES pain (10-100)[a]	51 (22)	51 (22)	52 (22)	53 (22)	50 (22)	53 (21)
ASES symp (10-100)[a]	58 (21)	57 (20)	60 (22)	59 (21)	58 (22)	59 (21)
HAD anxiety (0-21)[a]	5.9 (4.3)	6.2 (4.3)	5.6 (4.3)	6.1 (4.3)	5.9 (4.4)	5.8 (4.1)
HAD depression (0-21)[a]	4.3 (3.7)	4.4 (3.7)	4.2 (3.6)	4.3 (3.6)	4.3 (3.7)	4.2 (3.7)
Physical activity[b]	69%	72%	66%	70%	68%	70%
Education level (>12 yrs)	37%	41%	33%	43%	31%	45%
Absenteeism[c]	28%	26%	30%	25%	31%	26%
Presenteeism[d]	45%	50%	39%	40%	45%	50%
Presenteeism (0-100)[e]	20 (29)	23 (31)	17 (27)	17 (28)	20 (30)	21 (29)

[a] Mean (SD), [b] % meeting the World Health Organisations recommendations of physical activity, [c] absenteeism=% with any sick leave, [d]presenteeism=% with any reduction of productivity at work, [e]presenteeism=mean (SD) reduction of productivity at work, were 0=no reduction

Table 2. Univariate Anova. Associations between presenteeism and disease variables, health-related quality of life and personal variables in patients with spondyloarthritis, β-est 95% CI, (n=1054-1439).

Potential associations	All β-est	CI 95%	p-value	R^2 %
BASDAI*	7.8	(7.1;8.5)	<0.001	31
BASFI	7.3	(6.8;7.9)	<0.001	32
EQ-5D[a]	-9.6	(-10.5;-8.8)	<0.001	27
ASES pain	-0.5	(-0.6;-0.4)	<0.001	13
ASES symptom	-0.5	(-0.6;-0.5)	<0.001	15
HAD anxiety	2.3	(1.9;2.6)	<0.001	11
HAD depression	3.4	(3.0;3.8)	<0.001	17
Disease duration	-0.1	(-0.3;0.07)	0.248	0
Physical activity[b]				
Not meeting rec	2.9	(-0.3;6.2)	0.078	0
Meeting rec	0			
Education level				
< 12 yrs	3.9	(0.8;7.0)	0.013	0
> 12 yrs	0			

[a] EQ-5D 0.1 unit. [b] Meeting or not meeting the World Health Organisations recommendations of physical activity. *n=1054. Bold text = significant level <0.05.

Table 3. Univariate Anova. Associations for presenteeism in disease subgroup Ankylosing spondylitis (n=334-388), Psoriatic arthritis (n=433-738) and Undifferentiated spondyloarthritis (n=263-314) respectively. β-est 95% CI

Potential associations	Men				Women			
	Young[a]	CI 95%	Old	CI 95%	Young	CI 95%	Old	CI 95%
Ankylosing spondylitis								
BASDAI	6.5	(4.9;8.0)	7.4	(5.0;9.7)	7.4	(4.9;9.9)	10.3	(6.8;13.8)
BASFI	6.1	(4.7;7.4)	5.7	(3.5;7.9)	8.4	(6.1;10.5)	5.5	(1.1;9.8)
EQ-5D[b]	-7.3	(-9.2;-5.4)	-7.8	(-10.9;-4.7)	-10.9	(-13.9;-7.9)	-9.5	(-15.6;-3.5)
ASES pain	-0.4	(-0.5;-0.2)	-0.5	(-0.8;-0.3)	-0.5	(-0.8;-0.2)	-0.6	(-1.1;-0.02)
ASES symptom	-0.5	(-0.6;-0.3)	-0.7	(-0.9;-0.4)	-0.6	(-0.9;-0.2)	-0.9	(-1.4;0.4)
HAD anxiety	2.2	(1.5;2.9)	2.5	(1.4;3.6)	2.5	(0.9;4.1)	4.3	(2.0;6.7)
HAD depression	2.5	(1.6;3.4)	3.2	(1.8;4.6)	2.6	(1.0;4.2)	6.2	(4.1;8.3)
Disease duration	-0.3	(-0.8;0.1)	-0.6	(-1.1;-0.1)	-1.5	(-2.4;-0.6)	0.3	(-1.4;0.9)
Physical activity[c]								
Not meeting rec	5.3	(-2.1;12.7)	8.2	(-3.4;19.7)	-7.0	(-22.1;8.1)	-0.9	(-24.1;22.4)
Meeting rec	0		0		0		0	
Education level								
< 12 yrs	3.2	(-3.7;10.2)	11.5	(0.3;22.7)	-1.0	(-13.8;11.8)	2.4	(-18.7;23.5)
> 12 yrs	0		0		0		0	
Psoriatic Arthritis								
BASDAI	6.3	(4.4;8.1)	9.4	(6.5;12.3)	8.3	(6.3;10.3)	8.6	(5.6;11.6)
BASFI	7.8	(6.4;9.1)	8.2	(6.4;10.0)	7.4	(6.0;8.7)	8.3	(6.4;10.1)
EQ-5D[b]	-7.5	(-9.5;-5.5)	-11.9	(-14.3;-9.4)	-9.7	(-11.8;-7.5)	-9.3	(-12.5;-6.1)
ASES pain	-0.3	(-0.5;-0.1)	-0.5	(-0.8;-0.3)	-0.4	(-0.6;-0.2)	-0.7	(-0.9;-0.5)
ASES symptom	-0.4	(-0.5;-0.3)	-0.6	(-0.8;-0.4)	-0.4	(-0.6;-0.3)	-0.6	(-0.8;-0.3)
HAD anxiety	2.6	(1.9;3.3)	2.5	(1.4;3.6)	1.5	(0.6;2.4)	1.7	(0.6;2.8)
HAD depression	3.8	(3.1;4.6)	3.1	(1.9;4.4)	2.5	(1.4;3.5)	3.2	(1.8;4.6)
Disease duration	-0.06	(-0.6;0.5)	-0.3	(-0.7;0.2)	0.1	(-0.5;0.7)	0.5	(-0.2;1.1)
Physical activity[c]								
Not meeting rec	0.5	(-6.5;7.6)	8.2	(-1.9;18.3)	-0.3	(-8.6;7.9)	-8.2	(-19.2;2.8)
Meeting rec	0		0		0		0	
Education level								
< 12 yrs	-5.0	(-12.7;2.6)	5.8	(-4.8;16.4)	10.1	(2.3;17.8)	5.4	(-5.2;16.1)
> 12 yrs	0		0		0		0	
Undifferentiated spondyloarthritis								
BASDAI	6.8	(4.5;9.1)	9.8	(4.8;14.9)	7.3	(5.1;9.4)	8.5	(4.7;12.2)
BASFI	6.6	(4.0;9.2)	5.6	(1.6;9.7)	7.8	(5.9;9.7)	8.4	(5.7;11.1)
EQ-5D[b]	-10.1	(-12.9;-7.2)	-8.9	(-13.6;-4.2)	-12.4	(-15.0;-9.9)	-9.3	(-13.3;-5.3)
ASES pain	-0.6	(-0.8;-0.4)	-0.6	(-1.2;-0.02)	-0.4	(-0.6;-0.1)	-0.5	(-0.8;-0.1)
ASES symptom	-0.5	(-0.7;-0.3)	-0.5	(-1.1;-0.07)	-0.6	(-0.8;-0.4)	-0.5	(-0.9;-0.1)
HAD anxiety	3.0	(1.6;4.3)	2.6	(-0.8;5.3)	3.0	(1.9;4.0)	1.0	(-0.8;2.9)
HAD depression	4.3	(3.1;5.6)	4.2	(1.5;7.0)	4.1	(3.0;5.2)	4.2	(1.8;6.5)
Disease duration	0.3	(-0.5;1.0)	-0.04	(-1.2;1.1)	-0.5	(-1.2;0.3)	0.2	(-1.0;1.3)
Physical activity[c]								
Not meeting rec	5.8	(-5.6;17.2)	13.5	(-7.3;34.3)	13.4	(2.3;24.5)	17.6	(1.0;34.1)
Meeting rec	0		0		0		0	
Education level								
< 12 yrs	7.2	(-3.9;18.3)	3.4	(-19.3;26.1)	4.5	(-5.4;14.3)	-9.7	(-25.8;6.5)
> 12 yrs	0		0		0		0	

[a]Young <53 yrs, [b] EQ-5D 0.1 unit, [c]Meeting or not meeting the WHO recommendations of physical activity. Bold text = significant level <0.05.