Assessment of work disability in seronegative spondyloarthropathy (SpA)

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Abstract

Objective

Seronegative spondyloarthropathy (SpA) such as ankylosing spondylitis (AS) affects patients during their working years and may contribute to work disability (WD). We determined the prevalence of WD (not working due to illness) and limitations in work productivity in AS using surveys, including the Work Limitations Questionnaire (WLQ).

Methods

This cross sectional study consisted of 203 patients with SpA received a mailed questionnaire asking about work status, the WLQ, HAQ, BASDAI, BASFI, BAS-G and Functional Comorbidity Index. Relationships between WD, WLQ, demograghics and disease activity were assessed through bivariate correlations and independent t-tests.

Results

Response rate was 40%; 64% had AS; 18.5% were work disabled. Those with WD were significantly older than non-WD, and had significantly higher scores on BASFI, BAS-G and patient global assessment of health. WD also had significantly more comorbid diseases than non-WD. WD prevalence was not associated with current longer duration of disease, higher HAQ scores or higher BASDAI scores. Using the WLQ, the average decrease in work productivity attributable to health was 8.3%. Decreases in time management (37.3%), physical demands (28.5%), mental-interpersonal demands (23.0%) and output (33.1%) were noted. Reduced productivity was not associated with demographic factors. Productivity loss for those still working was highly correlated (r>0.6) with the HAQ, BASFI, BASDAI, and BAS-G. Subjects with primary AS had less WD than those with other SpA (related to psoriasis, inflammatory bowel disease or reactive arthritis). WD was associated with older age and, HAQ scores and self-reported function on the BASFI. Losses in work productivity in those still working were highly correlated with the HAQ, BASFI, BASDAI and BAS-G. AS had less work disability than other SpA. Adjusting for gender, age, and duration of diseased did not affect the results.

Conclusions

WD occurred in 18.5% of SpA, and work productivity (in those working) was reduced by 8.3%. WD was associated with older age and greater SpA disease activity. Losses in work productivity were highly correlated with currently used clinical outcome measures such as HAQ, BASFI, BASDAI and BAS-G.

Key words

Spondyloarthritis, disability, employment, work, productivity.

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Introduction

Ankylosing spondylitis (AS) is a complex, chronic inflammatory disorder causing disease of the sacroiliac (SI) joints and spine, as well as peripheral joints and extra-articular sites (1). AS is a disease that often affects young adults, classically occurring in the second or third decade of life, with a mean age of onset of 26 years (1). There are several forms of AS, including primary disease (AS alone) and secondary AS associated with other systemic disease, such as psoriasis (Ps), inflammatory bowel disease (IBD) and post-infectious reactive arthritis (ReA) (1). Since AS affects patients during their working years, work disability (WD) is an important disease outcome.

A meta-analysis of European and American studies has shown variable rates of WD in AS, ranging from 3–50% (2). This WD contributes significantly to the cost of care for AS in Canada, about 38% of total annual cost of AS(3). Areas of impact include reduced income, early retirement, and increased sick leave (3). A Canadian cohort was recently studied using patients largely from Alberta and Ontario (3). In this mail-based survey, 20% of patients reported that they had retired from their jobs due to AS (3) Other alterations in work patterns included a reduction in working time (9.5% of patients) or change in work (8.4% of patients) (3). Annual sick leave use was only marginally higher than that of the general population (8 days/year *vs*. 7.5 days/year) (3). Work limitations, particularly in those still employed, have not been extensively studied.

WD has been defined as the state in which the affected individual has had to leave their job, or forced to work fewer hours (partial WD) (4). More is known about WD rheumatoid arthritis (RA) than in AS (4).

Variable methodologies have been used in WD studies. The easiest employment outcome to measure is days or hours missed from work, but not all WD leads to absenteeism. Recently, the concept of *presenteeism*, or decreased work performance due to health conditions, has emerged in the WD literature (5). Presenteeism includes decreased productivity due to time not spent on task, decreased quality of work, decreased quantity of work and personal factors (5). Several self-reported workplace productivity instruments have been developed, and measure elements of presenteeism (5). One such tool is the Work Limitations Questionnaire (WLQ) (6).

Our study aimed to determine the prevalence of WD in patients with a history of AS or other SpA (seronegative spondyloarthropathy). Secondary objectives included assessment of risk factors for WD such as age, gender, education, physically demanding work, comorbid diseases and high disease activity as assessed by commonly used clinical tools. These clinical tools included the Health Assessment Questionnaire (HAQ), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Patient Global Score (BAS-G) and the Functional Comorbidity Index (FCI). We also compared the results of the WLQ to these same demographic risk factors and clinical outcome tools.

The WLQ is a 25-item, self-administered questionnaire that assesses work limitation on 4 scales: time demands, physical demands, mental-interpersonal demands and output demands (7). It measures on-the-job work limitations as well as loss of productivity at work (presenteeism). WLQ scores may be converted into estimates of productivity loss. The WLQ has been highly validated and has been shown to have good reliability. The HAQ is a self-reported measure of disability, which has become one of the dominant functional instruments in the field of arthritis (8). We used the HAQ-DI scored from 0-3 (no functional limitations – limited in most activities). The BASDAI is the current gold standard for measuring disease activity in AS (9). The BASFI is composed of 10 questions, which assess functional limitation in AS patients (10). It assesses limitations due to functional anatomy and patients' ability to cope in everyday life (10). The BAS-G is a single-item, patient administered, global assessment score that reports patients' well-being over a certain period

of time (11). The Functional Comorbidity Index (FCI) is an 18-item yes/no questionnaire designed specifically to determine how patients' comorbidities affect their physical functioning (12).

We hypothesised that: a large percentage of patients with SpA would be work disabled; that there could be differences in WD rates in AS *vs*. other SpA; risk factors for WD would include disease duration, disease activity and level of education; WD, as assessed by the WLQ, would correlate highly with currently used measures of disease activity, severity and function (such as HAQ, BASDAI, BASFI and BAS-G). Additionally, we hypothesised that even those who were employed would have decreased work productivity. The rate of WD would be less than RA as this has been the case in other studies. The current rate of WD in RA in our clinic is 30% (13).

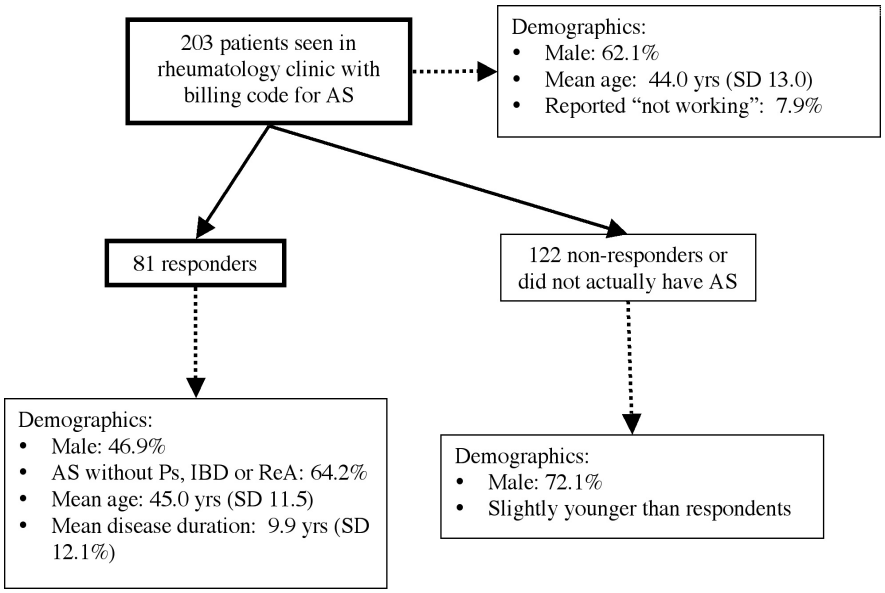

Fig. 1. Study design with details regarding demographic features of responders and non-responders.

Methods

The study was approved by the University of Western Ontario ethics board. This cross sectional study was conducted using a convenience sample of all patients who had been diagnosed with AS by a rheumatologist and had attended a rheumatology clinic. We modelled various response rates to determine potential margin of error (14). We assumed a population size of 200, confidence level of 95% and response distribution of 50%. Using this technique, a 60% response rate would give a margin of error of 5.67%, a 50% response rate a margin of error of 6.95% and 40% response rate a margin of error of 8.42%. To obtain a margin of error of 5%, a sample size of 132 respondents (66% response rate) would be needed.

The study population consisted of 203 patients with AS, confirmed by a rheumatologist, who attended a rheumatology clinic at St. Joseph's Health Center in London, Ontario. The sampling frame was obtained by searching OHIP billing codes for a diagnosis of 720 (SpA; AS) in all patients seen in the clinic in from March 2007-March 2008. Subjects were excluded if they were under the age of 18. Participants received a study package by mail, containing a letter explaining the study, the WLQ, HAQ, BASDAI, BASFI, BAS-G, FCI, and a 10-cm fatigue visual analogue scale (VAS). To improve response rates, subjects were telephoned to remind them to complete their surveys. New survey sets were sent to those who requested them.

Analyses were performed using SPSS (15). Relationships between WLQ and demographic information, other measures of disease activity, and presence of multiple comorbidities were assessed through χ^2 and bivariate correlation. Two-tailed tests were used with a level of significance of $p<0.05$. Linear regression was used to determine the impact of various independents on the dependent loss in health related work productivity (%). Logistic regression was used to predict dependent variables on the basis of continuous and categorical independents, thus allowing the determination of the percent of variance in the dependent that could be explained by the independents. Binomial logistic regression was used for dichotomous dependents (such as work disabled, yes/no). The enter method was used. Probability for stepwise entry was 0.05, and for removal was 0.10, with 20 maximum iterations.

Results

Eighty-one completed questionnaire packages were returned (response rate 40%), reporting a physician diagnosis of AS most frequently (64.2%), followed by spondylitis associated with IBD (21.0%). A smaller number of subjects reported spondylitis associated with psoriatic skin disease or reactive arthritis occurring after a prodromal genitourinary or gastrointestinal infection. There were notable differences between respondents and non-respondents, summarised in Figure 1. Non-responders tended to be younger male subjects (Fig. 1).

Demographics of the respondents are shown in Table I. Almost half were employed outside of the home in a full-time, paid position (49.4%), 18.5% were not working, part-time paid work outside of the home was reported in 12.3%, and 7.4% participated in unpaid work at home. 39.5% of respondents had decreased the number of hours they worked per week due to their arthritis. Subjects also reported having to work reduced hours at work (Table II). On average, they worked shorter hours 3.7 days of each work week; the exact number of hours of reduced work was not collected. Additionally, respondents who were employed reported missing an average of 2.5 complete days of work/month due to arthritis. 14.8% described conflict at work due to lack of productivity or absences. Bath Indices indicated moderate disease (mean scores: BASFI 4.6, BASDAI 5.2, BAS-G 5.0). The mean HAQ score of the respondents was 0.90.

Those with WD were significantly older

than non-WD (52.9 *vs*. 43.1 years, $p<0.05$). Patients with AS not associated with other disease (Ps, IBD or ReA) tended to have less WD than those with other systemic manifestations ($p<0.001$). WD individuals also had higher scores on BASFI (6.8 *vs*. 4.1), BAS-G (6.5 *vs*. 4.6). Spondylitis with WD also had significantly more comorbidity than non-WD (4.0 *vs*. 2.3 comorbid conditions). Though not significant, those with WD had a trend toward higher HAQ scores. WD was not associated with longer duration of disease or higher BASDAI scores. Table I summarises these associations.

Results of the WLQ in working respondents indicated an overall decrease in work productivity due to health of 8.3%. Of these respondents with decreased work productivity, significant decreases in time management (37.3%), output (33.1%), physical demands (28.5%) and mental-interpersonal demands (23.0%) were noted (Fig. 2). Reduced WLQ productivity was highly correlated with traditional measures of disease activity and function, such as HAQ, BASFI, BASDAI and BAS-G (Pearson's $r>0.65$ in each case). Using non-parametric tests (Spearman's rho) did not change the results. Table III summarises these results.

Although AS with other systemic disease had more WD, in those working, there was no significant association between type of AS (dichotomised into AS *vs*. spondylitis from other disease) and WLQ productivity loss ($p=0.175$). Gender was also not associated with productivity loss ($p=0.989$), nor was level of education ($p=0.299$). Age and years of disease activity did not correlate with loss of productivity. Not surprisingly, income level was associated with WD ($p=0.01$), with lower incomes reporting greater work productivity losses.

Univariate binary (binomial) linear regression was carried out for the dichotomous dependent variable work disabled (yes/no). Of the demographic factors, age and number of comorbid medical conditions were significantly associated with work disability (OR 1.10 (95% CI: 1.03, 1.18) and 1.35 (95% CI: 1.05, 1.73), respectively). Higher scores on WLQ time management, mental-interpersonal skills, and output were all significantly associated with WD (Table IV). Additionally, higher scores on HAQ, VAS patient global assessment, BASFI and BAS-G scores were significantly associated with WD (Table IV). Multinomial logistic regression did not add any extra information to the results yielded by the univariate regressions.

Table V summarises the results of univariate linear regression for the dependent outcome of % loss in health related work productivity as measured by the WLQ. Interestingly, age, years of disease activity and duration of morning stiffness did not correlate with loss in work productivity. Other outcome measures, such as HAQ score, VAS scores for pain, fatigue, sleep and global health, BASFI, BASDAI and BAS-G were highly correlated with losses in work productivity. There was also a significant correlation between loss in work productivity and an increasing number of comorbid medical conditions.

Table I. Comparison of clinical characteristics and clinical outcome measures in those with and without WD.

Characteristic	Mean in all respondents (SD) (n=81)	Mean in not WD group (SD) (n=63)	Mean in WD group (SD) (n=15)	p-value Not WD *vs*. WD
Age	**45.0 yrs (11.5)**	**43.1 yrs (11.3)**	**52.9 yrs (9.1)**	**<0.05**
% Male	46.9 52.1	77.8 0.154		
Disease duration	9.9 yrs (12.1)	10.0 yrs (12.0)	9.3 yrs (12.6)	0.85
HAQ score	0.90 (0.61)	0.78 (0.56)	1.38 (0.59)	0.89
VAS pain score	4.9 (2.8)	4.7 (2.8)	6.0 (2.2)	0.053
VAS fatigue score	5.6 (3.0)	5.4 (3.0)	6.6 (2.4)	0.155
VAS problem sleep score	5.2 (3.3)	4.9 (3.3)	6.2 (3.0)	0.188
Duration of morning stiffness	107.7 min (271.7)	97.6 min (251.9)	68.0 min (49.7)	0.654
BASDAI score	5.2 (2.5)	5.0 (2.5)	6.2 (2.2)	0.342
BASFI score	**4.6 (2.8)**	**4.1 (2.6)**	**6.8 (2.4)**	**<0.05**
BAS-G score	**5.0 (2.6)**	**4.6 (2.5)**	**6.5 (2.5)**	**<0.05**
Number of comorbidities		**2.3 (1.8)**	**4.0 (3.3)**	**<0.05**

Table II. Summary of work restrictions reported in those still working.

Characteristic (n=66)	Result
Number of hours worked/week	29.2 hrs (SD 20.1)
Decreased number of hours worked/week	39.5%
Mean days/month of reduced work hours	3.7 days (SD 8.1)
Mean days off/month	2.5 days (SD 6.2)
Conflict at work	14.8%

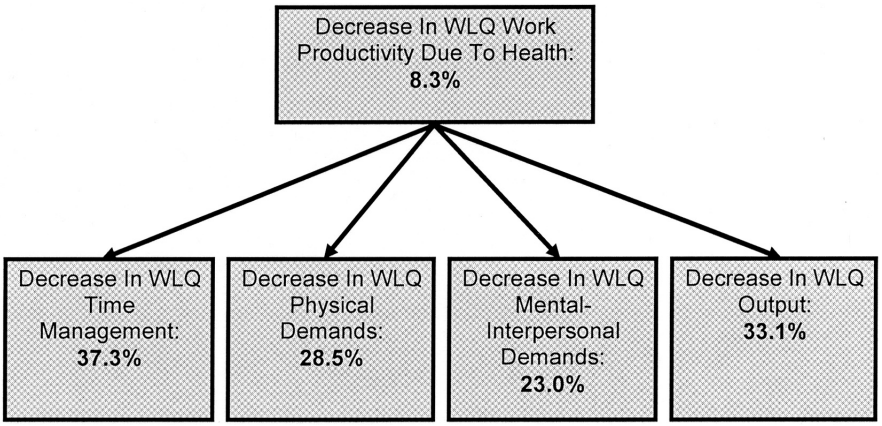

Fig. 2. Results of WLQ work productivity analysis.

Table III. Correlation of clinical characteristics and clinical outcome measures with WLQ work productivity loss.

Factor	Pearson r	*p*-value	Spearman's rho	*p*-value
Age	-0.02	0.87	-0.05	0.71
Disease Duration	-0.18	0.19	-0.18	0.19
HAQ	0.72	<0.001	0.70	<0.001
VAS pain	0.65	<0.001	0.65	<0.001
VAS fatigue	0.67	<0.001	0.71	<0.001
VAS problem sleep	0.64	<0.001	0.64	<0.001
VAS overall health	0.84	<0.001	0.82	<0.001
Morning stiffness	0.21	0.115	0.52	<0.001
BASFI	0.68	<0.001	0.65	<0.001
BASDAI	0.69	<0.001	0.69	<0.001
BAS-G	0.67	<0.001	0.66	<0.001
Number of comorbidities	0.31	0.02	0.34	0.01

Table IV. Results of univariate binary logistic regression. In each case, the dependent is work disabled (yes/no). Each variable is run separately.

	Work disability		
Variable	Exp (B)	95% CI for Exp (B) (lower, upper)	Significance
Age (years)	1.104	1.029, 1.184	0.006
Gender (male)	3.220	0.606, 17.112	0.170
Years of disease activity	0.995	0.949,1.044	0.851
WLQ time management score	1.038	1.001, 1.077	0.042
WLQ physical score	1.026	0.995, 1.058	0.098
WLQ mental interpersonal skills score	1.061	1.014, 1.111	0.011
WLQ Output score	1.106	0.998, 1.225	0.055
Loss in health-related work productivity (%)	1.415	1.023, 1.958	0.036
HAQ score	6.561	2.027, 21.243	0.002
VAS pain score	1.216	0.968, 1.528	0.093
VAS fatigue score	1.168	0.941, 1.449	0.158
VAS sleep score	1.132	0.941, 1.362	0.189
VAS Patient global assessment	1.366	1.059, 1.761	0.016
Duration of morning stiffness (minutes)	0.999	0.996, 1.003	0.662
BASFI score	1.610	1.189, 2.180	0.002
BASDAI score	1.255	0.972, 1.621	0.082
BAS-G score	1.431	1.077, 1.901	0.013
Number of comorbidities	1.349	1.054, 1.727	0.017

Table V. Results of univariate linear regression. In each case, the dependent is loss in health related work productivity (%). Each variable is run separately.

	Loss in health-related work productivity (%)		
Variable	B	95% CI for B (lower, upper)	Significance
Age (years)	-0.013	-0.177, 0.150	0.871
Years of disease activity	-0.104	-0.260, 0.052	0.186
Income ($)	-1.747	-2.764,-0.730	0.001
HAQ score	8.058	5.995, 10.120	0.000
VAS pain score	1.477	1.017, 1.937	0.000
VAS fatigue score	1.440	1.015, 1.865	0.000
VAS sleep score	1.275	0.866, 1.684	0.000
VAS patient global assessment	2.136	1.764, 2.509	0.000
Duration of morning stiffness (minutes)	0.007	-0.002, 0.17	0.115
BASFI score	1.698	1.211, 2.186	0.000
BASDAI score	1.779	1.193, 2.196	0.000
BAS-G score	1.695	1.193, 2.196	0.000
Number of comorbidities	1.177	0.212, 2.141	0.018

Discussion

In our study, 18.5% were work disabled, which is consistent with previous studies, and very similar to the reported rates in other Canadian populations. Our findings also indicate that a substantial proportion (8.3%) of working subjects with AS suffer from losses in work productivity due to health. The cause of this decreased productivity is multifactorial, and includes issues with time management, physical function, mental-interpersonal skills and reduced output.

The WLQ has been used in the assessment of work limitations in patients with RA(16). In this cross-sectional study, WLQ scales were linked to observed productivity so that individual scores could be interpreted as decreased productivity in comparison to healthy controls. The results revealed highly skewed WLQ scores for patients with RA (16). Almost one quarter of respondents indicated that they had no work limitations, and less than 1% indicated high levels of work limitations (scores >30) (16). Overall, those with RA had 4.9% decreased work productivity in comparison to controls (16).

Treating AS aggressively can be daunting due to the high costs of medications, such as anti-TNF drugs. However, our findings show that WD in this population is not small, and WD has a high impact on costs. Resource utilisation and costs of AS have been recently studied in a Canadian cohort (3). Mean annual costs of AS per patient were estimated at $9 008 (Canadian dollars), with indirect costs representing 38% (3). Half of the direct costs were attributed to patients' out of pocket expenses, such as over the counter medication and informal care (3). Notably, the study found that the costs of AS were not normally distributed. A small number of patients with high levels of functional impairment disease increased costs substantially (3). Functional impairment was a stronger driver of costs than disease activity (3). The difference in cost from the lowest level of functional impairment to the highest was $25,000 (3). Increasing age was also associated with increasing costs, but sex was not (3). We found that the most severely affected patients were the most likely to be work disabled, which is as expected.

This is the first study to directly assess losses in work productivity for those currently working in AS and other SpA. Other studies have examined outcomes in adults with juvenile AS, but none have looked directly at work disability and productivity (17). The WLQ is a well-established tool for the assessment of losses in work productivity, and its use in other rheumatic diseases allows for a crude comparison to other conditions. Presenteeism is increasingly important to both employers and employees, and our study shows that work limitations were high in this group. This is also the first study to demonstrate that AS associated with other systemic disease has higher rates of WD than those with AS alone. We hypothesise that those with other systemic manifestations are likely prone to flares of their non-arthritic condition, which contributes to their work disability status. We also hypothesise that those with psoriasis, IBD or reactive arthritis may suffer from greater peripheral joint involvement, thus greater impacting work than predominantly axial primary AS. Interestingly, those who are able to work are just as productive as those with AS alone.

Weaknesses of this study include a cross-sectional design and moderate response rate using an "available patient cohort" (18). Our poor response rate did not allow us to meet our target sample size as indicated by our power calculations. Because of this, it can only describe WD at the time that the respondents filled out their questionnaires, and does not describe WD in AS over the course of this disease. We did use all AS patients seen over 1 year by 6 rheumatologists. However, it may be difficult to generalise the results from our sampling frame to other centres.

We also acknowledge that the different groups of AS (AS alone versus that associated with Ps, IBD or reactive) could differ significantly from each other. Ideally, larger numbers would be recruited so that these subgroups of AS can be examined individually and compared with each other.

This study also did not examine the impact of medication use (such as the use of biologic agents) on WD. Greater numbers would again be needed to examine this issue.

Since this study only included patients seen at one large rheumatology clinic and results were reported for those who responded, there could be sampling error (19). Every effort was made to capture all patients seen in London rheumatology clinics, but response rates were low. Additionally, differences existed between responders and non-responders (Fig. 1). A thorough chart review was conducted, which showed that non-responders were younger and more likely to be male than those who responded. Traditionally, males have been thought to have more severe AS than females, so this significant gender bias in our results may impact the generalisability to other populations.

The use of billing codes to identify subjects can lead to bias. However, all identified subjects underwent chart review to ensure that their treating rheumatologist had diagnosed AS.

Not all patients with AS attend rheumatology clinics, which could bias results. Those who do not attend the clinics would likely have less severe disease.

Conclusions

We conclude that in our AS population, WD occurred in 18.5%. Subjects with systemic disease associated with AS (Ps, IBD, ReA) had higher rates of WD than those with AS alone. Of those who were working, 8.3% suffered losses in work productivity due to their arthritis. These findings suggest that AS has a high burden of disease in our population.

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