OP0034

DO SMOKING AND SOCIO-ECONOMIC FACTORS INDEPENDENTLY INFLUENCE IMAGING OUTCOMES IN AXIAL SPONDYLOARTHRITIS? FIVE-YEAR DATA FROM THE DESIR COHORT

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Background: Smoking and systemic inflammation have been shown to independently associate with radiographic spinal progression in patients with axSpA. Furthermore, evidence suggests that certain socioeconomic (SE) factors (e.g. physically demanding jobs) may modify these associations, but clarity on the intricate relationships between smoking, axial damage and SE factors is yet to be achieved. Moreover, the impact of smoking and SE factors and their interplay on axial inflammation have not been thoroughly investigated to date.

Objectives: To investigate the relationship between smoking and imaging outcomes (SI joints, spine, MRI and radiographs) over time in axSpA and to assess if SE factors first modify and if not, confound, such a relationship.

Methods: Patients with axSpA from the DESIR cohort who fulfil the ASAS axSpA classification criteria were included. Four imaging continuous outcomes (X-ray spine [mSASSS, range 0-72]; X-ray SIJs modified New York grading [mNY, 0-8]; MRI-Spine [SPARCC, range 0-414] and MRI-SIJ [SPARCC, range 0-72]) have been scored by 3 central readers independently (average score used) in one session, blinded for time order (baseline, 2 and 5 years). Smoking, the main variable of interest, was tested as a binary variable to indicate smoking status since last visit. SE variables tested were: age, gender, ethnicity (Caucasian vs other), job type based on 'collar' (blue [manual labour work] vs white [office-based work]); educational status (low vs high [university]); marital status (married vs not) and parental (number of children) status. Potential interactions between smoking and SE factors were first investigated and, if statistically ($p < 0.15$) and clinically relevant, models were stratified. The effect of smoking on imaging outcomes was assessed in multivariable time-varying models using generalized estimating equations making use of all available observations and adjusted for other known possible confounders (see table).

Results: In total, 425 axSpA patients were included: 225 [53%] male, 167 [40%] smokers and 287 [68%] blue collar. The mean baseline (SD) MRI-SIJ SPARCC was 4.67 (7.85), MRI-spine SPARCC: 2.73 (7.95); mSASSS: 0.39 (1.66); mNY: 1.70 (1.84). A significant interaction was found between smoking and job type with MRI-SIJ inflammation as the outcome ($p = 0.031$) as well as with mNY grading ($p = 0.096$). Similarly, educational status also proved to modify the association between smoking and MRI-SIJ inflammation ($p = 0.026$). In the multivariable models, smoking was significantly associated with more MRI-SIJ inflammation over 5 years of follow-up but only in patients with a blue-collar job (β [95% CI]: 3.35 [0.54, 6.17]) (table). Results were similar in the low education stratum (β [95% CI]: 2.69 [0.48, 4.91]. Smoking was not significantly associated with any of the other imaging outcomes over time. Male gender was positively associated with MRI-SIJ inflammation regardless of job type, and also with MRI-Spine inflammation and structural damage although only for blue-collar patients in the case of SIJ damage.

Table. (Time-varying) relationship between smoking and imaging outcomes across all patients or in strata according to type of job.

OUTCOME	MRI-SIJ (SPARCC)		mNY-SIJs		MRI-Spine (SPARCC)	mSASSS-Spine
	EVER BLUE COLLAR	NEVER BLUE COLLAR	EVER BLUE COLLAR	NEVER BLUE COLLAR	ALL PATIENTS	ALL PATIENTS
	β Coefficient (95% CI)	β Coefficient (95% CI)	β Coefficient (95% CI)	β Coefficient (95% CI)	β Coefficient (95% CI)	β Coefficient (95% CI)
Model numbers	N=64	N=198	N=85	N=209	N=381	N=403
Smoking (vs not)	3.35(0.54,6.17)	0.47(-1.08,2.02)	0.43(-0.04,0.90)	0.05(-0.08,0.18)	1.32(0.04,2.67)	0.49(-0.11,1.08)
Age	-0.16(-0.34,0.01)	-0.10(-0.20,-0.00)	-0.09(-0.05,0.04)	0.01(-0.01,-0.02)	0.07(-0.03,0.17)	0.06(0.02,0.10)
Gender (M vs F)	3.35(0.89,7.01)	1.61(0.24,2.99)	1.38(0.56,2.20)	0.59(0.05,1.07)	2.48(1.34,3.62)	0.55(0.04,1.06)
Married (vs not)	-3.45(-9.38,2.49) ^a	-0.60(-2.15,0.96)				
CRP abnormal at visit (vs not)	8.09(2.97,13.20)	3.02(0.98,5.09)			4.18(2.13,6.23)	
NSAID score (last 6 months)			0.00(-0.00,0.00) ^a	-0.00(-0.00,0.00)		-0.00(-0.00,0.00) ^a
cSDMDARD use last 6m (vs not)	-4.43(-7.47,-1.39)	-2.15(-3.46,-0.84)	-0.35(-0.60,-0.10)	0.01(-0.07,0.10)	-2.46(-3.58,-1.34)	
THF use					-1.46(-2.64,-0.28)	
Presence of uveitis					-1.81(-2.91,-0.72)	

Other independent variables tested in models included HLA B27 status, all SE variables of interest, ASDAs or BASDAI, presence of psoriasis, inflammatory bowel disease and peripheral arthritis. ^aIndicates confounding effect on the association between smoking and the outcome.

Conclusion: There is a strong association between smoking and MRI-SIJ inflammation over time in axSpA patients with blue collar job type or with low education, irrespective of other socio-economic factors, systemic inflammation and treatment. These findings suggest a possible role for mechanical stress (seen with manual jobs) amplifying the effect of smoking on axial inflammation in axSpA. No significant relationship was found between smoking and spinal inflammation or axial damage, possibly also due to the limited imaging changes in this cohort.

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OP0035

DEPRESSION IN ANKYLOSING SPONDYLITIS AND THE ROLE OF DISEASE-RELATED AND CONTEXTUAL FACTORS: A STRUCTURAL EQUATION MODELLING APPROACH

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Background: Patients with ankylosing spondylitis (AS) are at increased risk of depression compared to the general population. Comorbid depression in AS likely has a multifactorial origin. While several disease-related and contextual factors have been associated with depressive symptoms in AS, a comprehensive model of their interrelations is currently lacking. Such a model could help understand the mechanisms leading to, or maintaining, depression in AS.

Objectives: To determine which factors contribute to depressive symptoms in AS, and to understand the relationships between relevant factors.

Methods: Data from patients with AS participating in the Dutch cross-sectional multicentre survey-based Social Participation in Ankylosing Spondylitis Study (SPASS) were used. Potential determinants included both contextual and disease-related factors. Depressive symptoms were assessed by the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D). A latent 'depression' variable was constructed by regressing the 7 manifest items of the HADS-D questionnaire on the outcome 'depression', to represent it more accurately. Candidate variables for the model were selected using univariable negative binomial regression. Direct and indirect associations between risk factors and the dimensional latent depression outcome were explored using structural equation modelling. Both theory-driven and data-driven approaches were explored. A final model was selected based on model fit criteria, clinical plausibility and explained variance in the outcome.

Results: Among 245 patients, median (interquartile range) HADS-D was 3 (1-6) and 44 patients (18%) had a HADS-D ≥ 8 , indicating possible depression. The theory-driven model had poor fit and was rejected. The data-driven approach led to a model with good fit. In this final model (see Figure), contextual factors associated with depressive symptoms were male gender, a history of depression, being employed, lower income, lower mastery and worse satisfaction with social role participation. Regarding disease-related factors, Bath AS Disease Activity Index (BASDAI) was the only determinant in the final explanatory model, acted only indirectly, and had less effect on depressive symptoms than several of the contextual factors. Mastery had a central role in the path diagram and was a mediator for the effects of BASDAI, income and satisfaction with social role participation on depressive symptoms. The final model explained 64% of the variance in the latent depressive symptoms outcome.

Figure 1. The final model of depression in AS, based on model fit criteria. Numbers above the arrows represent the standardized regression coefficients of direct paths. Standardized regression coefficients can be interpreted as the change in y (dependent variable) in y standard deviation units for a standard deviation change in x (independent variable). The numbered HADS items represent the individual corresponding items on the HADS questionnaire.

Conclusion: Both contextual and disease-related factors contribute to depressive symptoms in AS, but contextual factors have a larger contribution. Mastery, the extent to which one feels in control over life and disease, has a key role in this process. These results support a relevance of self-efficacy in disease management and patient education. In order to improve patients' mental health, research is warranted whether mastery and its relation with depression can be modified.

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