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Published in:
British Journal of Dermatology

DOI (link to publication from Publisher):
10.1111/bjd.16539

Publication date:
2018

Document Version
Accepted author manuscript, peer reviewed version

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Article type : Research Letter

Pulmonary function in subjects with psoriasis: A cross-sectional population study

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Conflicts of interest: None

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DEAR EDITOR, Psoriasis is a prevalent chronic inflammatory disease associated with comorbidities, e.g. cardiometabolic diseases, inflammatory bowel disease, and depression that may share an inflammatory origin.[1] Smoking increases the risk of psoriasis and the disease has also been linked to chronic obstructive pulmonary disease (COPD) and asthma, with evidence of shared inflammatory cytokine-mediated mechanisms.[2-4] Moreover, subjects with psoriasis display increased risk of infections, especially respiratory infections including pneumonia.[1, 5] However, only a small single-center study of pulmonary function in subjects with psoriasis is available.[6]

We performed a cross-sectional study of spirometric values in individuals with self-reported psoriasis compared to controls that participated in the Danish General Suburban Population Study (GESUS).[7] A total of 20422 individuals >20 years including 1173 (5.7%) with psoriasis and 19249 in the comparison group underwent pulmonary function test with use of a hand-held spirometer (MicroLoop, Micro Medical Ltd, Kent. UK). Forced expiratory volume in the first second (FEV1) and forced vital capacity (FVC) were measured in percentages of expected reference values corrected for height, age and sex, and the FEV1/FVC ratio was calculated.[8] Psoriasis, shortness of breath, and prior pneumonia were identified by the questions 'do you suffer from or have you suffered from psoriasis?', 'are you frequently bothered by shortness of breath?', and 'did you suffer from pneumonia that entailed medical attention and/or sickness leave within the last 10 years?', respectively. The study conformed with the Helsinki Declaration and was approved by the regional ethical committee (SJ-113, SJ-114, SJ-191) and the Danish Data Protection Agency.

Characteristics of the two groups are shown in Table 1. Specifically, mean body mass index (BMI) was higher and smoking, and frequent shortness of breath or prior pneumonia within the last 10 years were more prevalent in the psoriasis group. These subjects also had increased body mass

index (BMI) and high sensitivity C-reactive protein (hs-CRP) levels. Increased risk of shortness of breath or pneumonia within the last 10 years remained significantly increased after adjustment for smoking. Relative to the comparison group without psoriasis, FEV1 in percent of expected values (93.2±16.8 vs. 94.9±16.4%; p<0.001) and the FEV1/FVC ratio (0.76±0.09 vs. 0.77±0.08; p<0.001) were reduced in the psoriasis group. FVC in percent of expected values was similar in the two groups. With additional adjustment for smoking, however, only the reduction in FEV1 remained statistically significant (delta value -1.6, 95% confidence interval [CI] -2.5 to -0.6%; p=0.002) whereas the proportions of individuals with FEV1<80% and FVC<80% of predicted values were not different between the two groups. Further adjustment for hs-CRP did not change these results (not shown). Moreover, the percentage of subjects with FEV1/FVC ratio<0.70 was increased in psoriasis (21.0 vs. 16.7%; p<0.001) with odds ratio 1.19 (95% CI 1.02 to 1.38; p=0.02) after adjustment for smoking.

To our knowledge these are the first population-based data on pulmonary function in patients with psoriasis. The disease was linked to increased rates of shortness of breath and pneumonia within the last 10 years, respectively. After full adjustment psoriasis was associated with a small decrease in FEV1 while FVC was not different from the comparison group indicating that the predominant pulmonary effect of the disease per se is on airway obstruction (FEV1) rather than FVC. Moreover, FEV1/FVC ratio<0.70 compatible with COPD or asthma was more prevalent in the psoriasis group in agreement with increased risk of COPD reported in observational studies.[2] Although the underlying mechanisms are unknown it is notable that smoking and prior pneumonia were more frequently reported in the psoriasis group and the disease has been linked to increased risk of serious infections, especially respiratory infections.[1, 5] It is also tempting to speculate that psoriasis-related inflammatory airway injury and remodeling plays a role. Indeed, psoriasis is considered to be an interleukin 23/T helper cell 17-driven disease and similar inflammatory mechanisms have been implicated in the pathogenesis of airway inflammation.[4]

Although epidemiological studies have found increased risk of COPD and asthma[2-4] only a single report is available on pulmonary function in psoriasis.[6] These investigators found reduced FEV1/FVC ratio but unaltered FEV1 in subjects with psoriasis (n=69) attending a dermatology clinic compared to controls with various other skin diseases.[7] In that report, subjects with psoriasis were also younger (mean age 42.8 years) than in our study and did not display certain psoriatic phenotype characteristics, e.g. increased BMI found in our study.[1, 7] Also, self-reported shortness of breath and prior pneumonia were not reported.[7] We here extend these earlier findings and our results from a population-based sample are important by suggesting that psoriasis is independently associated

with a small but significant reduction of FEV1. Although the magnitude of this reduction was small and of questionable clinical significance it is possible that this may contribute to increased shortness of breath in subjects with psoriasis.

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Table 1. Demographic, clinical and spirometric characteristics of the study population.

Continuous variables	**Comparison group (n=19249) (mean±SD)**		**Psoriasis (n=1173) (mean±SD)**		**p**
Age, years	56.1±13.6		57.0±12.5		0.027
BMI, kg/m^2	26.7±4.7		27.2±4.9		<0.001
hs-CRP, mg/L	2.74±5.49		3.12±5.94		0.022
FEV_1, % of expected value	94.9±16.4		93.2±16.8		<0.001
FVC, % of expected value	95.8±15.1		95.1±16.6		0.16
FEV_1/FVC ratio	0.769±0.085		0.759±0.090		<0.001
Categorical variables	**n (%)**		**n (%)**		
Males	8771 (45.6)		528 (45.0)		0.73
Smoking					<0.001
Never	7542 (41.4)		350 (30.9)		
Previous	3379 (40.1)		535 (47.2)		
Current	1831 (18.5)		248 (21.9)		
	Comparison group n (%)	**Psoriasis n (%)**	**p**	**OR (95% CI)†**	
Pneumonia within the last 10 years	4708 (25.0)	342 (29.7)	<0.001	1.21 (1.05;1.38)	0.006
Frequently bothered by shortness of breath	680 (3.6)	61 (5.2)	0.004	1.38 (1.04;1.80)	0.02
FEV_1<80% of expected value	2848 (14.9)	199 (17.1)	0.04	1.10 (0.93;1.29)	0.27
FVC<80% of expected value	2353 (12.3)	158 (13.6)	0.21	1.09 (0.91;1.29)	0.36
FEV_1/FVC ratio<0.7	3193 (16.7)	244 (21.0)	<0.001	1.19 (1.02;1.38)	0.02

BMI: body mass index; CI: confidence interval; hs-CRP: high sensitive C-reactive protein; FEV1: forced expiratory volume in the first second; FVC: forced vital capacity; SD: standard deviation; OR: Odds ratio; CI: confidence interval, †) Values adjusted for smoking