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Funding sources: none.

Conflicts of interest: The authors declare they have no conflicts of interest.

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## COVID-19 vaccination intention among patients with psoriasis compared with immunosuppressed patients with other skin diseases and factors influencing their decision

DOI: 10.1111/bjd.19882

DEAR EDITOR, Psoriasis is a chronic, immune-mediated skin disease with systemic involvement. Therapeutic advancements in its management have considerably improved disease activity and quality of life, and reduced hospitalization rates. Nevertheless, prolonged immunosuppression in patients with psoriasis may increase their susceptibility to opportunistic infections. Studies report higher rates of severe infections requiring hospitalization in patients who have psoriasis compared with those who do not, with lower respiratory tract infections being the most common.<sup>1</sup> Accordingly, dermatology societies worldwide advocate vaccination for this high-risk population.<sup>2–4</sup> The current COVID-19 crisis has raised substantial concerns among patients with psoriasis, particularly those who are immunosuppressed.<sup>5</sup> However, the promising results of COVID-19 vaccines seem to be turning SARS-CoV-2 infection into a preventable disease. The objective of this study was to compare the intention of patients with moderate-to-severe psoriasis to be vaccinated against SARS-CoV-2 with the equivalent intention of patients with other skin diseases who also receive immunosuppressive medication. Additionally, in patients with psoriasis alone, we examined factors associated with a positive or negative stance on vaccination.

This observational, single-institution study was conducted between 10 and 25 November 2020 at the First Department of Dermatology (Aristotle University, Thessaloniki, Greece). Overall, 1026 adult patients with records in our outpatient clinic were contacted via telephone. In total 941 individuals

consented to be interviewed about their intention to be vaccinated and the factors influencing their decision. Of these, 713 had psoriasis and 228 had other skin conditions (bullous pemphigoid, pemphigus vulgaris, atopic dermatitis, hidradenitis suppurativa under adalimumab) and formed the control group. Measured covariates were age, sex, education level, type of treatment (systemic therapies or biologics), presence of psoriatic arthritis (PsA) and the onset of the disease in patients with psoriasis only. A history of any of the following comorbidities considered by the Centers for Disease Control and Prevention to unequivocally confer a higher risk for developing severe COVID-19 disease was also analysed: chronic obstructive pulmonary disease (COPD), heart conditions, chronic kidney disease, diabetes mellitus, obesity, smoking, solid organ transplant and malignancy.<sup>6</sup>

All patients in both groups were under immunomodulatory or immunosuppressive treatment (biologics, corticosteroids, methotrexate, ciclosporin) and consistently followed the relevant vaccination recommendations. The study followed a matched-subjects design on a pro rata basis in respect of age, sex and comorbidities. Data were processed solely for the purpose of medical research. No patient identifiers were collected. The study did not require approval by the ethical committee of Aristotle University.

Logistic regression was used to calculate the odds of vaccination in patients with psoriasis compared with the control group. In patients with psoriasis only, factors affecting their perception of COVID-19 vaccination were determined through multivariable logistic regression.

Patients with psoriasis were 32% more willing to receive the vaccine compared with the control group [odds ratio (OR) 1.32, 95% confidence interval (CI) 1.28–1.36]. Among patients with psoriasis, individuals with concomitant PsA were nearly 20% more likely to undergo COVID-19 vaccination (OR 1.18, 95% CI 1.13–1.23), after adjusting for age, sex and type of treatment. However, the younger the age, the higher the chances of vaccination among this subgroup of patients with psoriasis compared with their counterparts without psoriasis.

In patients with psoriasis, determinants linked to the receipt of the vaccine were further researched. In the multivariable model seven factors appeared to contribute positively to COVID-19 vaccination: younger age (OR 1.27, 95% CI 1.18–1.39), female sex (OR 1.19, 95% CI 1.12–1.23), higher education level (OR 1.13, 95% CI 1.08–1.27), treatment with biologics (OR 1.48, 95% CI 1.32–1.64), and history of COPD (OR 1.61, 95% CI 1.49–1.73), diabetes (OR 1.19, 95% CI 1.12–1.26) or malignancy (OR 1.15, 95% CI 1.09–1.23) (Table 1). Onset of psoriasis did not affect decision making regarding immunization. Patients with psoriasis who were reluctant to get vaccinated ( $n = 142$ , 19.9%; vs.  $n = 109$ , 47.8% in the control group) reported concerns mainly about its safety and efficacy (94%), risk of psoriasis flares (21%) and inconvenience (0.8%).

Satisfactory levels of herd immunity can only be achieved through high rates of vaccination coverage and acceptance.



**Table 1** Characteristics of the study population and adjusted odds ratios (ORs) for the intention of COVID-19 vaccination in patients with psoriasis

	Psoriasis, n = 713	Other skin conditions, n = 228	OR (95% CI) <sup>a</sup>
Age (years), mean (SD)	56.1 (18.3)	52.6 (10.5)	1.27 (1.18–1.39)
Female, n (%)	342 (48.0)	117 (51.3)	1.19 (1.12–1.23)
Type of therapy, n (%)			
Systemic treatment	102 (14.3)	201 (88.2)	1.02 (1.01–1.03)
Biologics	611 (85.7)	27 (11.8)	1.48 (1.32–1.64)
Age of psoriasis onset (years), mean (SD)	32 (11.0)	–	0.98 (0.80–1.18)
History of smoking, n (%)	484 (67.9)	166 (72.8)	1.03 (0.97–1.25)
Education level, n (%)			
Low	101 (14.2)	38 (16.7)	0.96 (0.78–1.15)
Medium	163 (22.9)	73 (32.0)	0.99 (0.81–1.12)
High	449 (63.0)	117 (51.3)	1.13 (1.08–1.27)
Comorbidities, n (%)			
Psoriatic arthritis	167 (23.4)	–	1.18 (1.13–1.23)
COPD	64 (9.0)	18 (7.9)	1.61 (1.49–1.73)
Heart conditions	124 (17.4)	32 (14)	0.89 (0.74–1.08)
Chronic kidney disease	49 (6.9)	14 (6.1)	1.04 (0.88–1.26)
Diabetes	129 (18.1)	46 (20.2)	1.19 (1.12–1.26)
Obesity	36 (5.5)	16 (7.0)	0.92 (0.83–1.02)
Solid organ transplant	2 (0.3)	1 (0.4)	1.02 (0.98–1.04)
Malignancy	86 (12.1)	25 (11)	1.15 (1.09–1.23)

CI, confidence interval; COPD, chronic obstructive pulmonary disease. <sup>a</sup>Patients with psoriasis only.

Amid the pandemic crisis, patient-reported health behaviours are of high translational value, as essential components of appraising preventative care. Our results demonstrate that COVID-19 vaccine acceptance among patients with psoriasis seems to be driven by heightened risk perception and health awareness, mostly in younger people and highly educated individuals. Nevertheless, our findings should be interpreted with caution, as our study is limited to a single centre.

In conclusion, a strong emphasis on the provision of evidence-based information to patients with psoriasis is needed. Factors influencing patients' decision to receive the vaccine and individual features of subpopulations should be considered whenever COVID-19 immunization strategies are designed by policymakers and national health systems.

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Funding sources: none.

Conflicts of interest: The authors declare they have no conflicts of interest.

## Mortality and clinical response of patients with bullous pemphigoid treated with rituximab

DOI: 10.1111/bjd.19890

DEAR EDITOR, Bullous pemphigoid (BP) is one of the most common autoimmune bullous diseases and is characterized by autoantibodies targeting BP230 and BP180. BP usually occurs