

Does the weather play a role in psoriatic disease?

Ryan T. Lewinson¹

1. Leaders in Medicine MD/PhD Program, University of Calgary, Calgary, Alberta, Canada

Introduction

Nearly one million Canadians live with psoriatic disease (1), the foundation of which is psoriasis. Psoriasis is an autoimmune disease characterized by regulatory T-cell defects leading to migration of immune cells to the epidermis, keratinocyte proliferation, and local release of inflammatory cytokines (2). This results in the classic psoriasis lesion, a sharply demarcated erythematous plaque with scale. Nearly 30% of individuals with psoriasis will progress to developing the associated condition of psoriatic arthritis (1). In this case not only does the individual experience skin lesions but also irreversible inflammatory joint damage. While genetic, lifestyle, and drug-related factors are believed to have a role in psoriatic disease (2), the contribution of environmental factors is less understood. We probably all recognize that our skin feels different from winter to summer, and similarly we may notice a particular 'sense' in our joints when a change in weather, such as rain, is imminent. Subjectively, we know the weather can affect our skin and joints, but what role does it have in the context of psoriatic disease?

Ultraviolet Radiation

One theory regarding climate and psoriatic disease has been that differing levels of ultraviolet (UV) radiation exposure alters immunologic signals related to psoriasis (3). This concept is central to treatment practices for psoriatic disease in which UV phototherapy can effectively improve psoriatic skin lesions (4). Given the benefit of UV light for psoriasis, one could then pose the question of whether healthy individuals who live in climates with higher UV exposure would be at reduced risk of developing psoriatic disease. In general, UV levels are increased towards the equator and decreased at the poles, as UV levels are directly related to proximity to the sun. Thus it might be hypothesized that national psoriatic disease prevalence would be inversely

proportional to the proximity of a given country to the equator. However, Jacobson et al. (5) found that psoriasis prevalence was not correlated with a country's absolute latitude relative to the equator. This study, however, did not account for factors such as genetics, socioeconomic status, lifestyle, and comorbid disease, which are also associated with psoriasis.

From a joint pain perspective, few studies have been performed on the effects of UV radiation on psoriatic arthritis. For other inflammatory arthropathies conflicting evidence exists. For example, in the case of Cutaneous Lupus Erythematosus (CLE), UV exposure seems to be related to arthralgia for a subset of patients (6). Conversely, for Rheumatoid Arthritis (RA), it was proposed that UV exposure may reduce the risk of disease development (7). It is important to recognize that both CLE and RA are classically seropositive arthropathies, while psoriatic arthritis is seronegative. It is not yet known if this would influence biological response to UV exposure.

Humidity

Humidity is a measure of the relative amount of moisture in the air. Laboratory studies have found that when skin is exposed to low levels of humidity, the tissue responds by increasing keratinocyte proliferation and degranulation of Mast cells, resulting in epidermal hypertrophy and inflammation (8). These findings are similar to the pathologic changes associated with psoriasis plaques (2). However, an epidemiological study from Spain found that psoriasis prevalence was similar in the dry, central-regions of the country compared to other more humid regions (9). Thus the role of humidity in psoriasis remains unclear.

Regarding pain in psoriatic arthritis, no study has specifically investigated the role of humidity in day-to-day pain variability. A case was previously reported where 47%

of workers in a moisture-damaged health facility developed rheumatic arthralgia of which one case was psoriatic arthritis (10). This was believed to be associated with abnormally high relative humidity indoors, although fungal exposure could also be a possibility. Conversely to this, a “climate therapy” study conducted on Norwegians with psoriasis found that psoriatic symptoms including perceptions of joint pain seemed to improve when individuals were relocated to a tropical island (11). It is possible that UV exposure also contributed to these changes, but it seems evident that the precise role of humidity in joint symptoms in psoriatic disease remains unclear.

Conclusion

There appears to be preliminary evidence that weather plays a role in psoriatic disease, but its specific relationship to disease development, progression, and management have yet to be determined. Likely, weather-related factors interact with a combination of genetic and lifestyle susceptibilities inherent to the individual patient. These relationships may be further elucidated through prospective studies in which these baseline traits can be accounted for. This may provide insight as to how weather can impact psoriatic disease, improve our understanding of disease physiology, and how weather-related benefits and risks can be optimized for individual patients. ■

References

1. What is Psoriasis? [Internet]. Ottawa: Canadian Psoriasis Network; 2016. Available from: <http://www.cpn-rcp.com/what-is-psoriasis/>.
2. Nestle FO, Kaplan DH, Barker J. Psoriasis. *N Engl J Med*. 2009;361:496-509.
3. Okada S, Weatherhead E, Targoff IN, Wesley R, Miller FW. International Myositis Collaborative Study. Global surface ultraviolet radiation intensity may modulate the clinical and immunologic expression of autoimmune muscle disease. *Arthritis Rheum*. 2003;48:2285-93.
4. Lapolla W, Yentzer BA, Bagel J, Halvorson CR, Feldman SR. A review of phototherapy protocols for psoriasis treatment. *J Am Acad Dermatol*. 2011;64:936-49.
5. Jacobson CC, Kumar S, Kimball AB. Latitude and psoriasis prevalence. *J Am Acad Dermatol*. 2011;65:870-3.
6. Foering K, Chang AY, Piette EW, Cucchiara A, Okawa J, Werth VP. Characterization of clinical photosensitivity in cutaneous lupus erythematosus. *J Am Acad Dermatol*. 2013;69:205-13.
7. Arkema EV, Hart JE, Bertrand KA, Laden F, Grodstein F, Rosner BA, et al. Exposure to ultraviolet-B and risk of developing rheumatoid arthritis among women in the Nurses' Health Study. *Ann Rheum Dis*. 2013;72:506-11.
8. Denda M, Sato J, Tsuchiya T, Elias PM, Feingold KR. Low humidity stimulates epidermal DNA synthesis and amplifies the hyperproliferative response to barrier disruption: implication for seasonal exacerbations of inflammatory dermatoses. *J Invest Dermatol*. 1998;111:873-8.
9. Ferrándiz C, Carrascosa JM, Toro M. Prevalence of Psoriasis in Spain in the Age of Biologics. *Actas Dermosifiliogr*. 2014;105:504-9.
10. Luosujarvi RA, Husman TM, Seuri M, Pietikainen MA, Pollari P, Pelkonen J, et al. Joint symptoms and diseases associated with moisture damage in a health center. *Clin Rheumatol*. 2003;22:381-5.
11. Mork C, Wahl A. Improved quality of life among patients with psoriasis after supervised climate therapy at the Canary Islands. *J Am Acad Dermatol*. 2002;47:314-6.