UC Davis
Dermatology Online Journal

Title
Impact of psoriasis flare and remission on quality of life and work productivity: a real-world study in the USA

Permalink
https://escholarship.org/uc/item/4vb7q7rr

Journal
Dermatology Online Journal, 22(7)

Authors
Korman, NJ
Zhao, Y
Roberts, J
et al.

Publication Date
2016

DOI
10.5070/D3227031643

Copyright Information
Copyright 2016 by the author(s).This work is made available under the terms of a Creative Commons Attribution-NonCommercial-NoDerivatives License, available at https://creativecommons.org/licenses/by-nc-nd/4.0/

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

Volume 22 Number 7
July 2016

Original

Impact of psoriasis flare and remission on quality of life and work productivity: a real-world study in the USA

Korman NJ,[1] Zhao Y,[2] Roberts J,[3] Pike J,[3] Sullivan E,[3] Tsang Y,[2] Karagiannis T[2]

Dermatology Online Journal 22 (7): 2

[1]University Hospitals Case Medical Center, Cleveland, Ohio, USA

[2]Novartis Pharmaceuticals Corporation, East Hanover, NJ, USA

[3]Adelphi Real World, Adelphi Mill, Bollington, Cheshire, UK

Correspondence:

Neil Korman
University Hospitals Case Medical Center
Cleveland, Ohio, USA
Tel. +001 216 844 3178
Email: Neil.Korman@UHhospitals.org

Abstract

Although psoriasis patients often report a negative impact on health-related quality of life (HRQoL) and work productivity, less is known about how disease burden varies between periods of flare and remission. The aim of this study was tocompare HRQoL and work productivity by disease activity level. Data were extracted from Adelphi 2011/2013 Disease Specific Programmes, two real world surveys of US dermatologists and psoriasis patients. HRQoL was measured using the EuroQOL 5-Dimension Health Questionnaire (EQ-5D) and Dermatology Life Quality Index (DLQI). Work productivity was measured using the Work Productivity Activity index (WPAI). Three levels of disease activity were constructed based on physician reports: remission, active not flaring, active, and flaring. Multivariable regression analyses explored the relationship between disease activity, HRQoL and work productivity, controlling for differences in demographics and comorbidities. Out of 681 psoriasis patients 24% were in remission, 62% had active disease without flaring, and 15% experienced active disease and were currently flaring. Greater disease activity was associated with worse HRQoL. EQ-5D scores decreased with more active disease (remission vs. active not flaring vs. active and flaring: 0.93 vs. 0.90 vs. 0.82; $p<0.05$), while DLQI scores increased (remission vs. active not flaring vs. active and flaring: 2.0 vs. 5.00 vs. 8.7; $p<0.05$). WPAI scores increased with disease activity indicating increased productivity loss (remission vs. active not flaring vs. active and flaring: 5.9 vs. 14.8 vs. 26.9; $p<0.05$). The same trends were confirmed by multivariable regression analyses.

Key words: Remission, flare, work productivity, quality of life

Introduction

Psoriasis is a chronic immune-mediated skin condition characterised by symptoms that include itching, painful skin, and scaling [1]. It is estimated that 3.2% of the adult population in the United States are affected [2]. The condition ranges from mild psoriasis, in which patients experience limited symptoms and body area coverage, to severe psoriasis in which body coverage is more extensive [3].

In addition to the skin-related symptoms of psoriasis, patients often report a negative impact on health-related quality of life (HRQoL) and reduced work productivity [4]. The psychological burden can be considerable with patients reporting a range of social and emotional problems [5, 6] Absenteeism from work and productivity loss is also recognized as a problem among psoriasis patients, [7, 8] with 49% of employed respondents reporting missed days off work related to psoriasis or psoriatic arthritis [7].

Although a variety of treatment options currently exist, there is no cure for psoriasis and individuals tend to experience periods of increased disease activity or flare, as well as periods of remission [9, 10]. Spontaneous remission is rare and drug treatment is usually required to achieve disease control [11]. Treatment efficacy is typically evaluated in terms of improvement in disease severity scores such as the Psoriasis Area and Severity Index (PASI) [12]. Although previous guidelines suggest that treatment can be continued if a patient has experienced an improvement of ≥75% on the PASI [12], recent improvement in the efficacy of therapeutic approaches to psoriasis supports the idea that a complete absence of symptoms should in fact be the main goal of treatment [13].

Disease burden is often higher among patients with moderate or severe psoriasis compared with those with mild psoriasis [7,14]. However, little is known about how disease burden varies during periods of active disease (i.e. when the patient is experiencing a flare or exacerbation).

The aim of the current analysis was to compare the HRQoL and work productivity between patients with different levels of disease activity (flare, active disease without flare, and remission) to better understand the complex relationship between disease activity, HRQoL and work impairment among patients with psoriasis.

Methods

A retrospective database analysis using the Adelphi 2011 and 2013 Psoriasis Disease Specific Programmes (DSPs® [15]) was undertaken to examine the relationship between disease activity (remission, active disease not flaring, active disease and flaring), HRQoL and work productivity. The Psoriasis DSPs® are real-world, cross-sectional, surveys collecting data from psoriasis patients and their treating dermatologists in the US. The research was conducted in full accordance with the US Health Insurance Portability and Accountability Act 1996 (HIPAA; www.hhs.gov/ocr/privacy/).

Sample Selection

Dermatologists (n=179) across different regions in the US were recruited from the East (33%), South (16%), Midwest (24%) and Western US (26%). The majority of dermatologists (92%) were office-based. All were required to have obtained their medical degree between 1972 and 2010, personally manage the care of patients with psoriasis, and see at least 10 patients with psoriasis in their clinic in a typical month. Each dermatologist was asked to complete Patient Record Forms (PRFs) for the next 7 eligible patients. The patients had to meet at least one of the following criteria to be included in the research: ever had an affected body surface area (BSA) of >10%; ever perceived by a physician as having moderate or severe psoriasis, or ever in receipt of systemic therapy for psoriasis. These patients were further invited to complete a Patient Self Completion (PSC) questionnaire independently on a voluntary basis. Only patients who completed the PSC were included in the present analysis and matched PRF and PSC data were linked..

Study measures

Physicians provided information on current disease activity by indicating whether the patient was in remission or currently experiencing a flare. Dermatologists were also asked to indicate current disease severity for each patient (mild, moderate or severe). The severity of itching, pain, and scaling symptoms was obtained with possible responses of not currently affected , mild, moderate, or severe. Physicians provided each patient's current comorbid conditions and body mass index (BMI)
Patient-reported HRQoL was measured using the EuroQoL 5-Dimension Health Questionnaire (EQ-5D;[16]), and the Dermatology Life Quality Index (DLQI; [17]). Work productivity was assessed using the Work Productivity Activity Index (WPAI; [18]).

EuroQoL 5-Dimension Health Questionnaire (EQ-5D)

The EQ-5D assesses HRQoL in terms of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Respondents indicate whether they experience no problems, some/moderate problems, or extreme problems. A summary score is derived ranging from -0.59 to 1, with lower scores indicating poorer health states.

Dermatology Life Quality Index (DLQI)

The dermatology-specific DLQI evaluates six domains: symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment. Respondents indicate the extent to which they have experienced problems in each of these domains. Scores for each domain are presented individually (expressed as a percentage) and summed to generate an overall DLQI score (maximum 30). Higher scores indicate lower HRQoL.

Work Productivity Activity Index (WPAI)

The WPAI assesses work time missed, time impaired while at work, overall work impairment, and activity impairment. Scores are expressed as a percentage of total work time with higher scores indicating less productivity. For patients not currently in employment, only the activity impairment domain is relevant.

Statistical analyses

Demographics, overall disease severity, symptom severity for itching, pain, and scaling, HRQoL, and work productivity were compared between patients in remission, those with active disease but not currently flaring, and those with active disease and currently flaring. Statistical comparisons between the disease status groups were conducted using the Mann-Whitney test for continuous variables and the Fishers or Chi Square test for categorical variables.

Multivariable regression analyses examined the relationship between disease activity, disease/ symptom severity, HRQoL and work productivity, controlling for patient demographics (age, gender, ethnicity, BMI) and comorbidities (psoriatic arthritis, hypertension, elevated cholesterol, anxiety, depression and diabetes). Specifically, ordered logistic regressions explored the association between disease activity, overall psoriasis severity, and symptom severities, whereas linear regressions were used to examine the association between disease activity and EQ5D, DLQI, and WPAI scores. Statistical significance was set at 0.05, and all analyses were performed in STATA statistical software version 13.1 (StataCorp, 2013. Stata statistical software: Release 13. College Station, TX, StataCorp LP).

Results

The sample included 681 psoriasis patients; 163 (24%) were in remission, 419 (62%) had active disease but were not flaring, and 99 (15%) had active disease and were flaring (**Table 1)**. All groups had similar demographics.

Table 1. Patient demographics

	Total	**Remission**	**Active not**	**Active and**

			flaring	flaring
N (%)	681 (100.0)	163 (23.9)	419 (61.5)	99 (14.5
Age, mean years (SD)	44.0 (15.6)	43.8 (14.6)	44.2 (15.8)	43.7 (16.7)
Gender, n (%) male	374 (55.0)	92 (56.4)	236 (56.5)	46 (46.5)
Ethnicity, % Caucasian	589 (87.5)	145 (89.5)	361 (87.2)	83 (85.6)
BMI ≤25, n (%) (underweight to normal)	226 (36.1)	56 (35.4)	134 (35.6)	36 (39.1)
25 < BMI ≤30, n (%) (overweight)	256 (40.9)	69 (43.7)	153 (40.7)	34 (37.0)
BMI >30, n (%) (obese)	144 (23.0)	33 (20.9)	89 (23.7)	22 (23.9)
Years since diagnosis, mean (SD)	5.6 (7.9)	6.5 (8.0)	5.1* (8.0)	6.1 (7.1)
BSA affected, mean % (SD)	9.7 (11.3)	3.2 (8.5)	11.0* (10.7)	14.8* (12.9)

SD: standard deviation, BMI: body mass index, BSA: body surface area.
*P<0.05 vs. remission

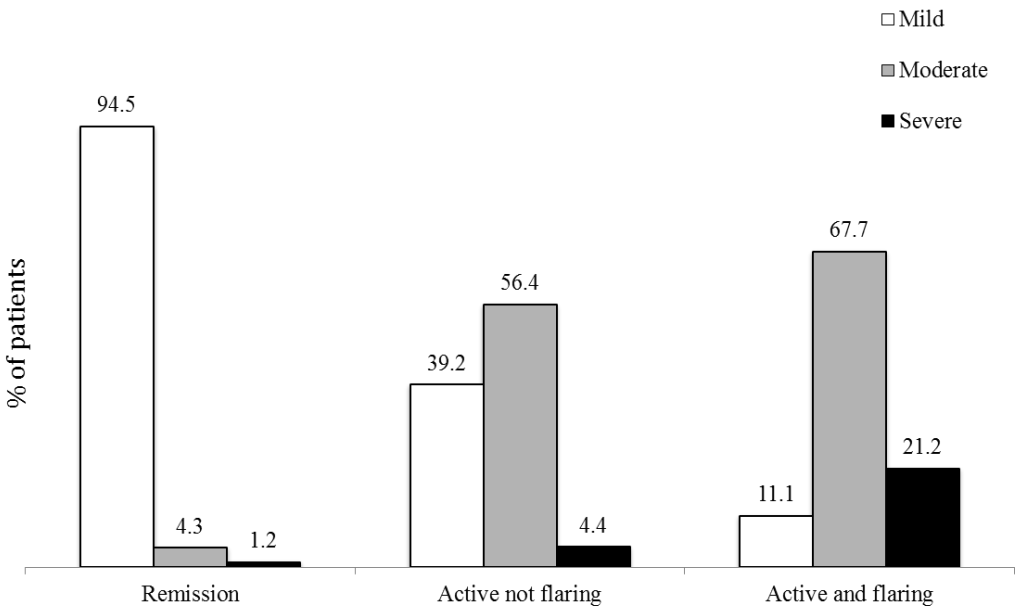

Figure 1. Overall disease severity by disease activity
All comparisons (Remission vs. active not flaring, Remission vs. active and flaring, and Active not flaring vs. active and flaring) were statistically significant at p<0.05

Disease activity, psoriasis severity, and key clinical symptoms

Both active and flaring patients and active not flaring patients displayed more severe overall disease compared with patients in remission (Figure 1, both $p<0.05$). For patients in remission, only 1.2% had severe overall disease and 4.3% were moderate. In comparison, 4.4% and 56.4% of patients with active disease but not flaring and 21.2% and 67.7% of patients with active disease and flaring had severe and moderate disease, respectively. Even when patients were thought to be in remission by their physician, many continued to experience residual symptoms, although they were usually mild (Figure 2). Specifically, 42.9% and 5.6% of these patients reported mild and moderate-to severe itching; 15.7% and 1.9% experienced mild and moderate-to-severe pain; and 52.8% and 4.4% experienced mild and moderate-to-severe scaling, respectively. Not surprisingly, active and flaring patients were the most symptomatic.

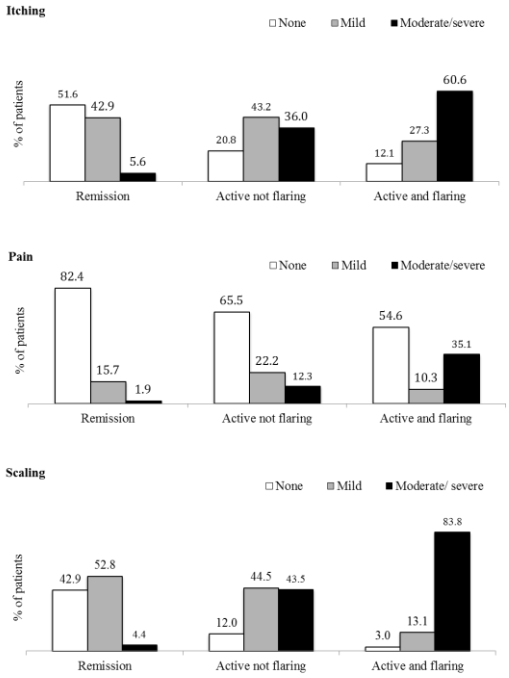

Figure 2. Symptom severity by disease activity
All comparisons (Remission vs. active not flaring, Remission vs. active and flaring, and Active not flaring vs. active and flaring) were statistically significant at $p<0.05$

Disease activity and HRQoL

EQ-5D scores decreased with more active disease (indicating worsening HRQoL) from 0.93 for patients in remission to 0.90 for patients with active disease but not flaring, and to 0.82 for patients with active disease and flaring (Fig. 3, $p<0.05$). DLQI scores increased with more active disease (indicating worsening HRQoL) from 2.0 for patients in remission to 5.0 for patients with active disease but not flaring up, and to 8.7 for patients with active disease and flaring (Figure 3, $p<0.05$). A similar pattern was observed for each of the 6 DLQI subdomains.

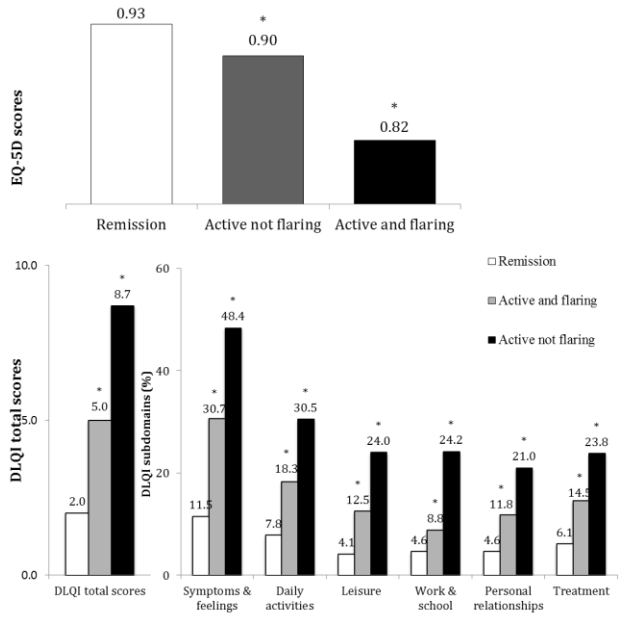

Figure 3. EQ-5D and DLQI scores
*P<0.05 compared to remission patients
EQ-5D scores range from -1.09 to 1 with higher scores representing better quality of life. DLQI total scores range from 0-30. Subdomains are expressed as a percentage. Higher scores indicate poorer quality of life.

Disease activity and work productivity impairment

WPAI scores increased (indicating greater impairment) from 5.9 for patients in remission, to 14.8 for patients with active disease but not flaring, and to 26.9 for patients with active disease and flaring (Fig. 4, p<0.05). A similar pattern was observed for the impairment at work and activity impairment subdomains. Although patients in remission scored significantly lower on the work time missed subdomain (2.1), compared with active and currently flaring patients (9.2; p<0.05), no significant differences in work time missed scores were observed between remission and active not flaring patients (3.1).

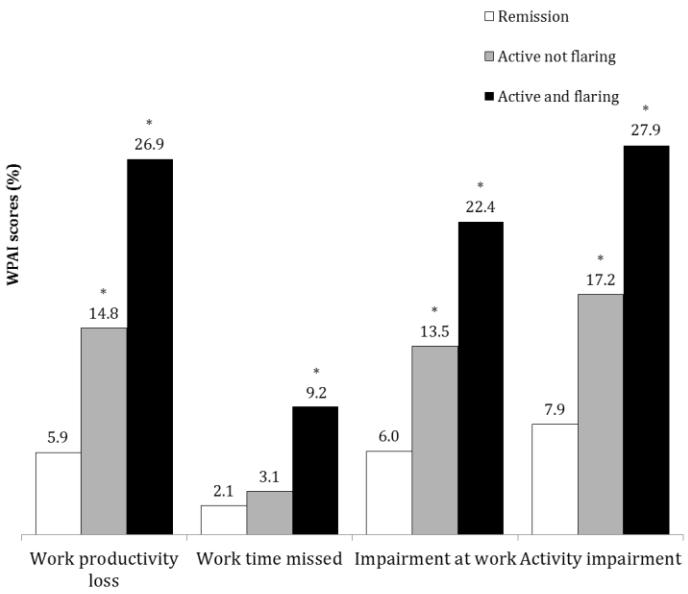

Figure 4. WPAI scores by disease activity
*P<0.05 compared to remission patients

WPAI scores are expressed as a percentage. Higher scores indicate increased productivity loss

Multivariable analysis

Controlling for between-group differences in demographics, BMI and comorbidities, patients with active disease were more likely to have a more severe level of itching (active not flaring: odds ratio [OR] (95% confidence interval) = 4.8 (3.1-7.4); active and flaring: OR = 11.3 (5.7-22.4)), pain (active not flaring: OR = 2.3 (1.3-3.9); active and flaring: OR = 4.8 (2.1-10.9)), and scaling (active not flaring: OR = 7.5 (4.6-12.3); active and flaring: OR = 50.1 (24.5-102.2)) compared with remission patients (**Table 2)**. Similarly, patients with active disease were more likely to have lower EQ-5D scores and higher DLQI total scores compared to patients in remission (all $p<0.05$). Patients with more active disease were also more likely to have higher WPAI scores indicating greater work productivity loss (all $p<0.05$).

Table 2. Multivariable Regression Results: impact of disease activity on overall disease severity, symptom severity, HRQoL and work productivity

	Disease and Symptom Severity[1]			
	Overall disease severity	Severity of itching	Severity of pain	Severity of scaling
Active not flaring	25.9* (12.6, 53.2)	4.8* (3.1, 7.4)	2.3* (1.3, 3.9)	7.5* (4.6, 12.3)
Active and flaring	132.2* (54.1, 323.2)	11.3* (5.7, 22.4)	4.8* (2.1, 10.9)	50.1* (24.5,102.2)

	HRQoL[2]							
			DLQI Subdomains					
	EQ-5D	DLQI total	Symptoms and feelings	Daily activities	Leisure domain	Work and school	Personal relationships	Treatment
Active not flaring	-0.03* (-0.05, -0.01)	2.7* (1.9, 3.4)	17.8* (14.1, 21.4)	9.4* (6.1, 12.7)	7.2 (4.6, 9.8)	4.1* (0.4, 7.9)	5.8* (3.0, 8.6)	6.1* (2.4, 9.9)
Active	-0.10* (-0.13, -0.07)	6.6* (5.1, 8.1)	36.3* (30.0, 42.7)	20.6* (13.8, 27.5)	19.6* (14.5, 24.6)	19.8* (11.4, 28.2)	16.6* (10.4, 22.8)	15.7* (9.3, 22.1)

	Work productivity[2]			
	% Work productivity loss	% Work time missed	% Impairment at work	% Activity impairment
Active not flaring	9.0* (4.7, 13.2)	0.06 (-2.9, 3.1)	7.4* (3.8, 11.1)	8.2* (4.8, 11.6)
Active and flaring	21.1* (13.1, 29.1)	6.9 (-0.9, 14.6)	14.9* (7.9, 21.8)	18.1* (12.3, 23.9)

Disease severity: mild, moderate, severe. Symptom severity: none, mild, moderate-to-severe.
[1] Ordered logistic regression odds ratios (confidence interval); [2] Linear regression coefficients (confidence interval). All analyses controlled for age, gender, ethnicity, body mass index category, psoriatic arthritis, hypertension, elevated cholesterol, anxiety, depression, and diabetes. *$p<0.05$; (Reference: remission)

Discussion

Psoriasis patients experience unpredictable flares and periods of remission. Using recent data from a large sample of dermatologists and their patients in the US, we found that more than three quarters of patients had active psoriasis (with or without flaring). Patients in remission, patients with active disease not currently flaring and patients with active disease who were currently flaring were demographically similar. However, mean BSA increased significantly with more active disease status. More active disease was also characterized by greater overall psoriasis severity, increased severity of psoriasis-related itching, pain and scaling, as well as reduced HRQoL (measured by both EQ-5D and DLQI) and work productivity (measured by the WPAI). Importantly, patients considered to be in remission by their physicians continued to experience some degree of symptomatology, with approximately half of the patients experiencing scaling and itching, and 15% experiencing pain (all reported by the physicians).

Findings from the current study indicate that the impact varies depending on how active the patient's psoriasis is. Patients with active disease who were currently flaring had the poorest outcomes, but patients with active disease not flaring also had reduced HRQol and work productivity compared with patients in remission. Although psoriasis may be controlled to a certain degree, patients with active disease but not flaring continued to experience detrimental HRQoL. This has potential implications for treatment goals and confirms that there is a benefit for patients in striving for remission rather than just treating exacerbations as they arise. Previous studies have suggested that even low levels of skin symptoms can impair HRQoL in patients with psoriasis [19]. It is also notable that patients in the present study patients thought to be in remission by their dermatologists continued to experience residual symptoms, as reported by their dermatologists. This may be reflective of physicians' expectations with regards to the level of psoriasis control that can be realistically achieved with current treatment options. Our results highlight that

physicians should pay close attention to specific psoriasis symptoms including itching, pain, and scaling and should be aware that complete remission will maximize the benefits to patients in terms of improved HRQoL and work productivity. Given that pain and itching may not be readily observable, these symptoms in particular should be discussed during physician-patient consultations.

A limitation of the current research relates to the sample selection. Only patients visiting their dermatologist were invited to participate. Therefore, this study is less likely to capture information on patients in long-term remission or patients with limited symptoms who would be less likely to consult their dermatologists.

Conclusion

Greater psoriasis disease activity was associated with poorer outcomes. Patients considered to be in remission by their treating physicians continued to experience residual symptoms.

References

1. Martin ML, McCarrier KP, Chiou CF, Gordon K, Kimball AB, Van Voorhees AS, Gottlieb AB, Huang X, Globe D, Chau D, Viswanathan HN, Kricorian G. Early development and qualitative evidence of content validity for the Psoriasis Symptom Inventory (PSI), a patient-reported outcome measure of psoriasis symptom severity. J Dermatol Treat.2013 Aug; 24(4): 255-260. [PMID:23249143]

2. Rachakonda TD, Schupp CW, Armstrong AW. Psoriasis prevalence among adults in the United States. J Am Acad Dermatol. 2014 Mar; 70(3):512–6. [PMID: 24388724]

3. Feldman. A quantitative definition of severe psoriasis for use in clinical trials. J Dermatol Treat. 2004 Jan; 15(1), 27–29. [PMID: 14754646]

4. Korman NJ, Zhao Y, Pike J, Roberts J, Sullivan E, Increased severity of itching, pain, and scaling in psoriasis patients is associated with increased disease severity, reduced quality of life, and reduced work productivity, Dermatol Online J. 2015 Oct; 16;21 (10). [PMID: 26632793]

5. Rapp, SR, Feldman SR, Exum ML, Fleischer Jr AB, ReboussinDM. Psoriasis causes as much disability as other major medical diseases. J Am Acad Dermatol. 1999 Sep; 41(3): 401-407. [PMID:10459113]

6. Richards HL, Fortune DG, Griffiths CE, Main CJ. The contribution of perceptions of stigmatisation to disability in patients with psoriasis. J. Psychosom Res. 2001 Jan; 50 (1): 11-15. [PMID: 11259795]

7. Armstrong AW, Schupp C, Wu J, Bebo B. Quality of Life and Work Productivity Impairment among Psoriasis Patients: Findings from the National Psoriasis Foundation Survey Data 2003–2011. PLoS ONE. 2012 Dec;7(12):e52935. [PMID: 23285231].

8. Pearce DJ, Singh S, Balkrishnan R, Kulkarni A, Fleischer AB, Feldman SR. The negative impact of psoriasis on the workplace. J Dermatol Treat. 2006 Jan; 17(1): 24-28.[PMID: 16467020]

9. Carey W, Glazer S, Gottlieb AB, Lebwohl M, Leonardi C, Menter A, et al. Relapse, rebound, and psoriasis adverse events: An advisory group report. J Am Acad Dermatol. 2006 Apr; 54(4, Supplement):S171–81. [PMID: 16488339]

10. Daudén E, Conejo J, García-Calvo C. Physician and Patient Perception of Disease Severity, Quality of Life, and Treatment Satisfaction in Psoriasis: An Observational Study in Spain. Actas Dermo-Sifiliográficas Engl. Ed. 2011; 102(4) 270–276. [PMID:21333962]

11. Menter A, Gottlieb A, Feldman SR, Van Voorhees AS, Leonardi CL, Gordon KB, Lebwohl M, Koo JY, Elmets CA, Korman NJ, Beutner KR, Bhushan R. Guidelines of care for the management of psoriasis and psoriatic arthritis: Section 1. Overview

of psoriasis and guidelines of care for the treatment of psoriasis with biologics. J. Am Acad Dermatol.2008 May; 58(5):826-850. [PMID: 18423260]

12. Mrowietz U. Implementing treatment goals for successful long-term management of psoriasis. *J Eur Acad Dermatol Venereol. 2012Mar; 26:12-20.* [PMID:22356631]

13. Gulliver W, Lynde C, Dutz JP, Vender RB, Yeung J, Bourcier M, Dion PL, Hong CH, Searles G, Poulin Y. Think beyond the Skin: 2014 Canadian Expert Opinion Paper on Treating to Target in Plaque Psoriasis. *J Cutan Med Surg.2015 Jan; 19(1): 22-27. [PMID:* 25775659]

14. Gelfand JM, Feldman SR, Stern RS, Thomas J, Rolstad T, Margolis DJ. Determinants of quality of life in patients with psoriasis: A study from the US population. *J Am Acad Dermatol.2004 Nov; 51(5):704-708.[PMID: 15523347]*

15. Anderson P, Benford M, Harris N, Karavali M, Piercy J. Real-world physician and patient behaviour across countries: Disease-Specific Programmes - a means to understand. Curr Med Res Opin. 2008 Nov; 24(11):3063–72. [PMID: 18826746]

16. EuroQol Group. EuroQol--a new facility for the measurement of health-related quality of life. Health Policy Amst Neth. 1990 Dec; 16(3):199–208. [PMID: 10109801]

17. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI)-a simple practical measure for routine clinical use. Clin Exp Dermatol. 1994 May; 19(3):210–6. [PMID: 8033378]

18. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. PharmacoEconomics. 1993 Nov; 4(5):353–65. [PMID: 10146874]

19. Viswanathan HN, Chau D, Milmont CE, Yang W, Erondu N, Revicki DA, Klekotka P. Total skin clearance results in improvements in health-related quality of life and reduced symptom severity among patients with moderate to severe psoriasis. J Dermatol Treat. 2015 Jun; 26(3): 235-9. [PMID: 25078334]

Abbreviations

BMI	Body mass index
BSA	Body surface area
DLQI	Dermatology Life Quality Index
DSP	Disease Specific Programme®
EQ-5D	EuroQoL 5-Dimension Health Questionnaire
HIPAA	Health Insurance Portability and Accountability
HRQoL	Health-related Quality of Life
OR	Odds Ratio
PASI	Psoriasis Area and Severity Index
PRF	Patient Record Form
PSC	Patient Self-Completion
SD	Standard Deviation
US	United Stated
WPAI	Work productivity Activity Index

Conflict of interests

The study was sponsored by the Novartis Pharmaceuticals Corporation where Yang Zhao is employed. When the study was conducted, Yuen Tsang and Tom Karagiannis were in fellowship programs sponsored by Novartis Pharmaceuticals Corporation.

Neil J Korman declares the following conflicts of interest: Neil Korman is a Professor of Dermatology at University Hospitals Case Medical Center and Clinical Director at the Murdough Family Center for Psoriasis in Cleveland, Ohio. He has served as a

speaker for Novartis, on an advisory board for Novartis and received grant funding for his participation in this project. Dr. Korman has also served on advisory boards for Abbvie, Amgen, Celgene, Eli Lilly, Janssen, and Pfizer, receiving grants and honoraria; was investigator for Abbvie, Amgen, Celgene, Eli Lilly, Pfizer, and and as a speaker for Abbvie, Celgene, Janssen, served as a consultant for Astellas; and operated as an investigator, speaker, and on advisory boards for Janssen where he received grants, honoraria, and residency/fellowship program funding.