

Supplementary Material

Longitudinal Instability of Minimal Disease Activity Domains in Psoriatic Arthritis with Fluctuating Response: A Trajectory Analysis of a Real-World Cohort

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Supplementary Methods of the Parent Study

Study Design and Participants

This was a retrospective observational study that analysed a longitudinal cohort of patients with psoriatic arthritis (PsA) enrolled at two Italian tertiary rheumatology centres (University of Molise and University of Rome Tor Vergata) [1]. Adult patients fulfilling the Classification Criteria for Psoriatic Arthritis (CASPAR) who initiated their first biologic or targeted synthetic disease-modifying antirheumatic drug (b/tsDMARD) between 2020 and 2023 were included [2]. All patients were required to be in non-minimal disease activity (non-MDA) at baseline and to have at least 24 months of continuous follow-up. Patients with alternative diagnoses (eg rheumatoid arthritis or other spondyloarthritis subtypes) or incomplete longitudinal data preventing reliable assessment of disease activity were excluded.

Clinical and Demographic Data Collection

Patients were assigned a unique anonymised identifier. Data were extracted from electronic medical records and institutional databases with manual verification when necessary. Assessments were performed at baseline (T0, treatment initiation) and every 6 months up to 24 months (T6, T12, T18, T24). Baseline variables included age, sex, disease duration, smoking status, and body mass index (BMI), categorised as normal weight (< 25 kg/m²), overweight (25–29.9 kg/m²), or obesity (≥ 30 kg/m²) [3]. Comorbidities were classified as cardiovascular, metabolic, psychiatric, fibromyalgia, or malignancy-related. A comorbidity was recorded if formally documented in clinical records and/or treated pharmacologically. PsA phenotype variables included peripheral pattern (oligoarticular or polyarticular), axial involvement, enthesitis (ever/never), dactylitis (ever/never), psoriasis (cutaneous and/or nail), uveitis, and inflammatory bowel disease (IBD). Previous and concomitant conventional synthetic DMARD (csDMARD) use was recorded. Treatment exposure referred to the first initiated b/tsDMARD, including TNF inhibitors, IL-17A inhibitors, IL-12/23 inhibitors, IL-23 inhibitors, Janus kinase (JAK) inhibitors, and phosphodiesterase-4 (PDE4) inhibitors. At each timepoint, clinical assessment included tender and swollen joint counts (TJC68, SJC66), Leeds Enthesitis Index (LEI), and Body Surface Area (BSA). Patient-reported outcomes included pain visual analogue scale (PtPnV), patient global assessment (PtGA), and Health Assessment Questionnaire–Disability Index (HAQ-DI) [4]. Disease activity was assessed using the Disease Activity index for Psoriatic Arthritis (DAPSA), categorised as remission (≤ 4), low disease activity (> 4 –14), moderate disease activity (> 14 –28), and high disease activity (> 28) [5]. Minimal disease activity (MDA) was defined as fulfilment of $\geq 5/7$ criteria [6].

Disease Trajectory Modelling

Longitudinal MDA status was assessed at T6, T12, T18, and T24. Only patients with complete MDA data at all timepoints were included in the trajectory analysis. Binary MDA outcomes across four assessments generated 16 possible longitudinal patterns, which were grouped into four clinically meaningful trajectories:

Super responders: achieved MDA by T6 and maintained it throughout follow-up without relapse.

Delayed responders: achieved MDA after T6 and maintained it thereafter.

Fluctuating responders: achieved MDA at least once but did not sustain it, with at least one loss of response.

Non-responders: never achieved MDA during follow-up.

Statistical Analysis

Descriptive statistics were performed using IBM SPSS Statistics version 28 (IBM, Armonk, NY, USA). Normality was assessed using the Shapiro–Wilk test. Continuous variables are reported as mean $\pm$ standard deviation (SD) or median (interquartile range, IQR), as appropriate. Categorical variables are expressed as counts and percentages. Longitudinal changes were analysed using repeated-measures ANOVA or Friedman test, depending on data distribution. Categorical repeated measures were assessed using Cochran’s Q test. Between-group comparisons across trajectory categories were performed using one-way ANOVA or Kruskal–Wallis tests, with Bonferroni-adjusted post hoc analyses where appropriate. Categorical variables were compared using chi-square or Fisher’s exact tests. Variables associated with trajectory membership in univariate analyses ($p < 0.05$) were entered into multivariable logistic regression models. Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs).

Supplementary Table 1.

Domain	Spearman’s ρ	p-value
PASI	0.13	0.19
SJC	0.09	0.37
TJC	-0.03	0.70
LEI	-0.08	0.39
PtPnV	-0.03	0.71
PtGA	0.01	0.88
HAQ	-0.11	0.25
OD	0.15	0.10
TBD	-0.09	0.31
SD	-0.08	0.37

Supplementary Table 1. Correlation between number of treatment changes and IS across MDA domains

References

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