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Effectiveness of Biological Therapy in Psoriasis: Real-World Evaluation of SII and SIRI as Biomarkers of Systemic Inflammation

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ABSTRACT

Introduction: Psoriasis is a chronic inflammatory skin disease characterized by accelerated keratinocyte turnover and systemic inflammation mediated by an altered immune response. Biological drugs have significantly improved treatment outcomes in moderate to severe psoriasis. The Systemic Inflammation Response Index (SIRI) and the Systemic Immune-Inflammation Index (SII) have emerged as potential biomarkers for assessing systemic inflammation.

Objective: The primary objective of this study was to assess changes in SIRI and SII over six and 12 months across different biological therapies (TNF-α, IL-17, IL-12/23, and IL-23 inhibitors) in patients with moderate-to-severe psoriasis. Secondary objectives included evaluating the impact of sex and comorbidities (obesity, metabolic syndrome, or psoriatic arthritis) on inflammatory markers reduction.

Methods: A retrospective observational single-center study was conducted analyzing records from January 2010 to December 2024. Patients with moderate-to-severe psoriasis (PASI >10) and at least one comorbidity were included. The study excluded those with other chronic inflammatory diseases or immunosuppressive treatment.

Results: Among 98 patients, TNF-α and IL-17 inhibitors showed the greatest SII reduction, while TNF-α and IL-12/23 inhibitors had the most significant SIRI reduction. Males exhibited a greater reduction in both indices. Among comorbidities, obesity was associated with the most pronounced de-

crease in inflammatory indices, followed by metabolic syndrome and psoriatic arthritis, which showed significant but less marked reductions.

Conclusions: SII and SIRI may serve as valuable biomarkers for monitoring systemic inflammation in psoriasis patients undergoing biological therapy. Further studies are needed to validate their role in routine disease management.

Introduction

Psoriasis is a chronic inflammatory skin disease characterized by accelerated keratinocyte turnover and systemic inflammation mediated by an alteration of the immune response[1]. It is an immune-mediated disease that develops from the interaction of genetic, immunological, and environmental factors that affect the skin[2,3], but is also associated with numerous systemic comorbidities[4,5] such as psoriatic arthritis[6,7], cardiovascular disorders[8–10], diabetes[9], obesity[11], metabolic syndrome[9,10,12], anxiety, and depression[13], with a significant impact on patient's quality of life[14,15]. It is known that pro-inflammatory cytokines such as tumor necrosis factor (TNF)-α, interleukin (IL)-17, and IL-23 are involved in the pathogenesis of the disease[5,16–18]. In recent years, the advent of biological drugs that interact with these cytokines and their receptors has revolutionized the treatment of moderate-to-severe psoriasis, offering greater therapeutic efficacy than traditional therapies[19–21]. However, the response to treatment varies from patient to patient and is not yet completely predictable[20].

The Systemic Inflammation Response Index (SIRI) and the Systemic Immune-Inflammation Index (SII) are innovative and integrated inflammatory biomarkers that have recently been used to evaluate the association between chronic inflammatory status and various diseases, including tumors, metabolic disorders, and chronic inflammatory diseases[22–25]. In particular, SII reflects the balance between pro-inflammatory and regulatory components of immunity, and an increase in it has been correlated to more marked systemic inflammation and a worsening of the disease. On the other hand, the SIRI is an index that reflects the state of activation of the innate inflammatory response; high SIRI values have been associated with greater severity of psoriasis[23,25]. Thanks to their ability to reflect immune activation and systemic inflammation, they represent potential tools for evaluating the severity and prognosis of various inflammatory conditions, including psoriasis.

Objectives

The identification of reliable biomarkers could optimize therapeutic management, improving the personalization of treatments[5]. We conducted a retrospective study, analyzing the role of two new systemic inflammation biomarkers, SIRI and SII, in the evaluation of the response to biological drugs in patients with psoriasis.

Methods

An observational retrospective single-center study was conducted by collecting data from patients attending the Severe Psoriasis Outpatient Clinic of the Dermatology Unit, IRCCS University Hospital of Bologna. Data from patients' medical records from January 2010 to December 2024 were collected. Data collection took place from September 2024 to December 2024.

The primary rationale of the study was to evaluate which biological drug—adalimumab, brodalumab, etanercept, guselkumab, ixekizumab, risankizumab, secukinumab, ustekinumab, tildrakizumab, or bimekizumab—lead to an earlier reduction in SIRI and SII inflammatory parameters in patients with moderate-to-severe psoriasis. The same evaluation was carried out based on the class of drug studied, divided into:

- TNF-α inhibitors: adalimumab, and etanercept
- IL-17 inhibitors: secukinumab, ixekizumab, brodalumab, and bimekizumab
- IL-12/23 inhibitors: ustekinumab
- IL-23 inhibitors: guselkumab, risankizumab, and tildrakizumab

The secondary objectives of the study were to assess the impact of the patient's sex on the time required for the SIRI and SII inflammatory parameters to decrease and to evaluate the influence of the patient's comorbidities on the duration needed for the reduction in these inflammatory parameters. In addition, it was evaluated whether the reduction in the SIRI and SII inflammatory parameters correlated with the reduction in the Psoriasis Area Severity Index (PASI) score.

The inclusion criteria for the study were patients with moderate-to-severe psoriasis (PASI score >10) at baseline, with at least one comorbidity, including obesity (body mass index (BMI) ≥30 kg/m2), metabolic syndrome, and/or psoriatic arthritis; naïve to biological therapy before starting the drug evaluated in the study, aged >18 years. Subjects with

other concomitant chronic inflammatory diseases or being treated with immunosuppressants other than biological drugs were excluded.

The following data were recorded: sex, history of the disease, presence of psoriatic arthritis, metabolic syndrome and/or obesity, and biological drug used. Complete blood count with formula and platelet count, PASI score, SIRI, and SII values at time 0 (start of therapy - baseline), time 6 (after 6 months of therapy), and time 12 (after 12 months) were also recorded. Outcomes were evaluated in terms of reduction in SIRI and SII scores. SII and SIRI were calculated using data obtained from the complete blood count; SII = platelet count ($x10^3$/μL) X neutrophil count ($x10^3$/μL) / lymphocyte count ($x10^3$/μL) and SIRI = neutrophil count ($x10^3$/μL) X monocyte count ($x10^3$/μL) / lymphocyte count ($x10^3$/μL).

Qualitative variables are described with counts and percentage frequencies, while quantitative variables are described with mean, standard deviation, median, and interquartile range. A multilevel mixed-effects linear regression analysis was conducted to study the evolution of SII and SIRI. The models included two levels (patients and follow-up measurements), with random intercepts and follow-up time as a categorical variable. The 'time-by-group' interaction was analyzed to assess posttreatment differences. The groups considered included drug therapy, sex, and comorbidities. The normality of the residuals was confirmed by the Q–Q plot. The analyses were performed using Stata 18 software. The level of significance was set at 0.05 with a two-tailed hypothesis system.

Results

Characteristics of the Patients in the Sample

A total of 98 patients were enrolled, divided by sex and biological drug as follows:

- Adalimumab: 5 male patients, 5 female patients
- Bimekizumab: 5 male patients, 2 female patients
- Brodalumab: 5 male patients, 5 female patients
- Etanercept: 6 male patients, 4 female patients
- Guselkumab: 8 male patients, 2 female patients
- Ixekizumab: 5 male patients, 5 female patients
- Risankizumab: 5 male patients, 5 female patients
- Secukinumab: 6 male patients, 5 female patients
- Tildrakizumab: 5 male patients, 5 female patients
- Ustekinumab: 7 male patients, 3 female patients

The characteristics of the patients in the sample are fully presented in Table 1.

The variations in PASI score for each class of drug at t0 (baseline), t6 (after 6 months), and t12 (after 12 months) are presented in Table 2.

Table 1. Characteristics of the patients enrolled.

Category	Values
Sex	
Male	58 (59%)
Female	40 (41%)
Years of disease	
Mean ± SD	19.5 ± 13.9
Median [IQR]	14 [9.5-28]
Drug	
Adalimumab	10 (10%)
Brodalumab	10 (10%)
Etanercept	10 (10%)
Guselkumab	10 (10%)
Ixekizumab	10 (10%)
Risankizumab	10 (10%)
Secukinumab	11 (11%)
Ustekinumab	10 (10%)
Tildrakizumab	10 (10%)
Bimekizumab	7 (7%)
Comorbidities	
Obesity	50 (51%)
Psoriatic arthritis	34 (35%)
Metabolic syndrome	29 (30%)
Number of comorbidities	
One	83 (85%)
Two	15 (15%)
PASI (t0)	
Mean ± SD	14.3 ± 4.3
Median [IQR]	13 [12-15]
PASI (t6)	
Mean ± SD	1.3 ± 2.8
Median [IQR]	0 [0-2]
PASI (t12)	
Mean ± SD	0.5 ± 1.1
Median [IQR]	0 [0-0]

Abbreviations: IQR: interquartile range; PASI: Psoriasis Area and Severity Index; SD: standard deviation.

Analysis of SII and SIRI for Biological Drugs

For each biological drug, the trend of the SII (Table 3) and SIRI (Table 4) parameters were analyzed at t0 (baseline), t6 (after 6 months), and t12 (after 12 months).

SII decreased significantly with adalimumab, brodalumab, etanercept, secukinumab, ustekinumab, and, to a lesser extent, with ixekizumab (after six months of therapy, P=0.015). On the other hand, there was no statistically significant variation with guselkumab, risankizumab, tildrakizumab, or bimekizumab. The drug associated with the most marked reduction in the inflammatory index was

Table 2. Variation of the PASI according to the class of drugs used.

	Drug class	Mean	Median	SD	IQR
PASI (t0)	TNF-α inhibitors	14.800	13.00	5.506	3.500
	IL-17 inhibitors	14.711	13.00	4.871	4.000
	IL-12/23 inhibitors	13.100	12.50	1.861	2.000
	IL-23 inhibitors	13.733	13.00	2.767	3.000
PASI (t6)	TNF-α inhibitors	2.225	1.00	3.888	1.875
	IL-17 inhibitors	0.895	0.00	2.007	1.000
	IL-12/23 inhibitors	1.000	0.00	1.589	3.000
	IL-23 inhibitors	1.217	0.00	2.863	1.000
PASI (t12)	TNF-α inhibitors	0.350	0.00	0.643	0.500
	IL-17 inhibitors	0.382	0.00	0.873	0.000
	IL-12/23 inhibitors	0.200	0.00	0.616	0.000
	IL-23 inhibitors	0.690	0.00	1.693	0.500

Abbreviations: IQR: interquartile range; PASI: Psoriasis Area and Severity Index; SD: standard deviation.

Table 3. SII trend according to the drug used for treatment.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Adalimumab				
t0	566.6	Rif.		
t6	434.3	-132.3	-264.6; -0.1	**0.050***
t12	400.3	-166.4	-298.6; -34.1	**0.014***
Brodalumab				
t0	695.7	Rif.		
t6	559.6	-136.1	-268.4; -3.8	**0.044***
t12	559.5	-136.2	-268.5; -3.9	**0.044***
Etanercept				
t0	613.5	Rif.		
t6	330.7	-282.8	-415.1; -150.5	**<0.001***
t12	307.8	-305.7	-437.9; -173.4	**<0.001***
Guselkumab				
t0	599.1	Rif.		
t6	468.4	-130.7	-263.0; 1.6	0.053
t12	473.7	-125.5	-257.7; 6.8	0.063
Ixekizumab				
t0	672.5	Rif.		
t6	508.1	-164.5	-296.7; -32.2	**0.015***
t12	560.9	-111.6	-243.9; 20.7	0.098
Risankizumab				
t0	552.7	Rif.		
t6	449.1	-103.5	-235.8; 28.7	0.124
t12	608.3	55.6	-76.6; 187.9	0.408
Secukinumab				
t0	764.1	Rif.		
t6	556.1	-208.0	-334.1; -81.9	**0.001***
t12	608.9	-155.2	-281.3; -29.1	**0.016***

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Ustekinumab				
t0	633.7	Rif.		
t6	500.2	-133.5	-265.7; -1.2	**0.048***
t12	494.2	-139.5	-271.7; -7.2	**0.039***
Tildrakizumab				
t0	553.4	Rif.		
t6	432.8	-120.5	-252.8; 11.7	0.074
t12	487.7	-65.7	-203.1; 71.8	0.347
Bimekizumab				
t0	534.6	Rif.		
t6	482.8	-51.8	-209.9; 106.3	0.519
t12	433.9	-100.7	-321.7; 120.3	0.370

Abbreviations: CI: confidence interval.

Table 4. SIRI trend according to the drug used for treatment.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Adalimumab				
t0	1.39	Rif.		
t6	1.06	-0.33	-0.72; 0.05	0.090
t12	0.99	-0.40	-0.78; -0.01	**0.044***
Brodalumab				
t0	1.10	Rif.		
t6	0.90	-0.20	-0.59; 0.18	0.298
t12	0.90	-0.20	-0.59; 0.18	0.298
Etanercept				
t0	1.32	Rif.		
t6	0.79	-0.54	-0.92; -0.15	**0.006***
t12	0.70	-0.63	-1.01; -0.24	**0.002***
Guselkumab				
t0	1.22	Rif.		
t6	1.09	-0.13	-0.51; 0.26	0.521
t12	1.08	-0.14	-0.52; 0.25	0.488
Ixekizumab				
t0	1.40	Rif.		
t6	1.12	-0.28	-0.67; 0.10	0.149
t12	1.19	-0.21	-0.60; 0.17	0.275
Risankizumab				
t0	1.15	Rif.		
t6	0.97	-0.18	-0.57; 0.20	0.345
t12	1.37	0.22	-0.17; 0.60	0.266
Secukinumab				
t0	1.54	Rif.		
t6	1.09	-0.45	-0.81; -0.08	**0.016***
t12	1.40	-0.14	-0.51; 0.22	0.445

Table4 continues

Table 4. SIRI trend according to the drug used for treatment. *(continued)*

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Ustekinumab				
t0	1.68	Rif.		
t6	1.01	-0.67	-1.06; -0.29	**0.001***
t12	1.14	-0.54	-0.92; -0.15	**0.006***
Tildrakizumab				
t0	1.32	Rif.		
t6	0.89	-0.43	-0.81; -0.05	**0.028***
t12	1.09	-0.24	-0.63; 0.16	0.243
Bimekizumab				
t0	0.95	Rif.		
t6	0.75	-0.20	-0.66; 0.26	0.391
t12	0.54	-0.41	-1.05; 0.23	0.205

Abbreviations: CI: confidence interval.

Table 5. SII trend according to the drug class used for treatment.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
TNF-α inhibitors				
t0	590.1	Rif.		
t6	382.5	-207.6	-300.6; -114.5	**<0.001***
t12	354.0	-236.0	-329.1; -143.0	**<0.001***
IL-17 inhibitors				
t0	679.7	Rif.		
t6	530.9	-148.8	-216.3; -81.3	**<0.001***
t12	555.0	-124.7	-195.0; -54.4	**0.001***
IL-12/23 inhibitors				
t0	633.7	Rif.		
t6	500.2	-133.5	-265.1; -1.9	**0.047***
t12	494.2	-139.5	-271.0; -7.9	**0.038***
IL-23 inhibitors				
t0	568.4	Rif.		
t6	450.1	-118.3	-194.2; -42.3	**0.002***
t12	524.0	-44.4	-121.3; 32.5	0.256

Abbreviations: CI: confidence interval.

etanercept both after six months of therapy ($P<0.001$) and after 12 months of therapy ($P<0.001$).

Regarding SIRI, it can be deduced that there was a significant decrease with adalimumab (after 12 months of therapy, $P=0.044$), etanercept, secukinumab (after six months of therapy, $P=0.016$), ustekinumab and tildrakizumab (after six months of therapy, $P=0.028$). On the other hand, there was no statistically significant reduction with brodalumab, guselkumab, ixekizumab, risankizumab, or bimekizumab. The drugs associated with the most marked reduction in inflammation were etanercept (after six months of therapy, $P=0.006$, and after 12 months of therapy, $P=0.002$) and ustekinumab (after six months of therapy, $P=0.001$ and after 12 months of therapy, $P=0.006$).

Analysis of SII and SIRI by Class of Biological Drug

In addition to analyzing each drug individually, we also evaluated the trend of SII (Table 5) and SIRI (Table 6) parameters at t0, t6 (after 6 months), and t12 (after 12 months) by class of biological drug.

It can be deduced that TNF-α inhibitors and IL-17 inhibitors were the two classes of drugs that were associated with a greater reduction in SII. IL-12/23 inhibitors also performed

Table 6. SIRI trend according to the drug class used for treatment.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
TNF-α inhibitors				
t0	1.36			
t6	0.92	-0.44	-0.70; -0.17	**0.002***
t12	0.85	-0.51	-0.78; -0.24	**<0.001***
IL-17 inhibitors				
t0	1.28			
t6	0.99	-0.29	-0.49; -0.10	**0.003***
t12	1.09	-0.19	-0.39; 0.01	0.063
IL-12/23 inhibitors				
t0	1.68			
t6	1.01	-0.67	-1.05; -0.29	**0.001***
t12	1.14	-0.54	-0.92; -0.16	**0.006***
IL-23 inhibitors				
t0	1.23			
t6	0.98	-0.25	-0.47; -0.03	**0.028***
t12	1.18	-0.05	-0.27; 0.17	0.668

Abbreviations: CI: confidence interval.

well, although with weaker statistical significance ($P<0.001$ for TNF- α and IL-17 inhibitors at t6 and t12, compared to $P=0.047$ at t6 and $P=0.038$ at t12 for IL-23 inhibitors). IL-23 inhibitors were associated with a lower capacity to reduce the inflammatory parameter, especially after 12 months of therapy ($P=0.256$).

As regards SIRI, a statistically significant reduction was observed especially for TNF-α inhibitors and IL-12/23 inhibitors; on the other hand, IL-17 inhibitors and IL-23 inhibitors performed less well, especially after 12 months of therapy ($P=0.063$ and $P=0.668$, respectively); in fact, the absolute values were higher at t12 than at t6, but were still lower than at t0.

Analysis of SII and SIRI by Sex

Analyzing the data by patient sex (Table 7 and Table 8), a statistically significant decrease in both SII and SIRI was observed in males ($P<0.001$). On the other hand, in females, a statistically significant reduction was observed in terms of SII (especially after six months of therapy) while, in terms of SIRI, the reduction was statistically significant after six months of treatment ($P=0.019$) but not after 12 months ($P=0.248$). Therefore, the male sex had a greater and earlier decrease in both inflammatory parameters.

Analysis of SII and SIRI for Associated Comorbidities

Finally, the comorbidities of the patients (obesity, metabolic syndrome, and psoriatic arthritis) were analyzed to assess which of these had the greatest impact on the reduction in the parameters (Table 9 and Table 10).

A statistically significant decrease in SII was observed across all three comorbidities, highlighting the effectiveness of biological therapy in reducing the inflammatory state associated with both the underlying disease and its comorbidities.

Regarding SIRI, the comorbidity in which the most significant reduction in the inflammatory parameter was observed was obesity. As for psoriatic arthritis and metabolic syndrome, a significant decrease was noted after six months of treatment ($P=0.004$ and $P=0.006$, respectively), but not after 12 months of treatment ($P=0.073$ and $P=0.072$, respectively).

Discussion

To date, there is no laboratory marker used to monitor the evolution of inflammation in patients with psoriasis undergoing biological drug therapy[5]. The introduction of these drugs has improved the control of moderate-to-severe psoriasis, reducing inflammatory parameters. However, their effect on SII and SIRI has not yet been fully elucidated, making further analysis necessary[24,25]. This study analyzed the correlation between biological therapy and the reduction in SII and SIRI in patients with psoriasis and comorbidities (metabolic syndrome, obesity, psoriatic arthritis) to identify the most effective drugs and the influence of sex and comorbidities on the inflammatory response.

Among the biological drugs analyzed, etanercept showed the most significant reduction in both inflammatory indexes,

Table 7. SII trend according to sex.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Male				
t0	616.5	Rif.		
t6	456.7	-159.8	-214.7; -104.9	**<0.001***
t12	454.2	-162.3	-218.2; -106.4	**<0.001***
Female				
t0	631.5	Rif.		
t6	496.0	-135.5	-201.6; -69.5	**<0.001***
t12	559.8	-71.7	-139.0; -4.5	**0.037***

Abbreviations: CI: confidence interval.

Table 8. SIRI trend according to sex.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Male				
t0	1.41	Rif.		
t6	0.98	-0.43	-0.59; -0.27	**<0.001***
t12	1.06	-0.34	-0.51; -0.18	**<0.001***
Female				
t0	1.20	Rif.		
t6	0.97	-0.23	-0.42; -0.04	**0.019***
t12	1.08	-0.11	-0.31; 0.08	0.248

Abbreviations: CI: confidence interval.

Table 9. SII trend according to comorbidities.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Obesity				
t0	664.8	Rif.		
t6	520.2	-144.5	-204.3; -84.8	**<0.001***
t12	536.7	-128.1	-188.2; -67.9	**<0.001***
Psoriatic arthritis				
t0	600.1	Rif.		
t6	433.0	-167.1	-239.5; -94.6	**<0.001***
t12	462.8	-137.3	-209.7; -64.9	**<0.001***
Metabolic syndrome				
t0	601.4	Rif.		
t6	460.2	-141.3	-219.7; -62.8	**<0.001***
t12	480.8	-120.6	-203.5; -37.8	**0.005***

Abbreviations: CI: confidence interval.

Table 10. SIRI trend according to comorbidities.

	Mean (×10^9/L)	Difference compared to baseline		
		Estimate	95% CI	*p*-value
Obesity				
t0	1.42	Rif.		
t6	1.06	-0.36	-0.54; -0.19	**<0.001***
t12	1.12	-0.30	-0.47; -0.13	**0.001***
Psoriatic arthritis				
t0	1.21	Rif.		
t6	0.89	-0.31	-0.52; -0.10	**0.004***
t12	1.02	-0.19	-0.40; 0.02	0.073
Metabolic syndrome				
t0	1.26	Rif.		
t6	0.94	-0.32	-0.55; -0.09	**0.006***
t12	1.04	-0.22	-0.46; 0.02	0.072

Abbreviations: CI: confidence interval.

confirming the data of the study by Morariu et al.[22] (p-value of SII=0.04 and p-value of SIRI=0.01). The mechanism of action of TNF-α inhibitors such as etanercept acts upstream of the inflammatory cascade, reducing the activation of pathogenic T lymphocytes and the production of pro-inflammatory cytokines[5,16,26]. In our study, unlike in that by Morariu et al.[22], guselkumab did not show a significant reduction in SII and SIRI, a result consistent with the study by Tamer et al.[25] (*P*=0.686). Ustekinumab was the second most effective drug in reducing the indices, especially after six months, with results comparable to those of Tamer et al.[25] (p-value of SII=0.001 and p-value of SIRI=0.001). However, the greater statistical significance of Tamer's study could depend on the larger sample size (58 patients vs. 10 in our study).

Analyzing the pharmacological classes, TNF-α and IL-17 inhibitors proved to be the most effective in reducing SII, in line with the data of Tamer et al.[25]. This could be due to the ability of these drugs to block the inflammatory process early on, making them more suitable for counteracting systemic inflammation than specific cutaneous manifestations. As for SIRI, the greatest reduction was observed with TNF-α and IL-12/23 inhibitors, as confirmed by Tamer et al. However, unlike in their study, in ours, the IL-17 inhibitors did not have a significant impact on SIRI (*P*=0.063), perhaps due to the different sample sizes (38 patients in our study vs. 80 in Tamer et al.[25]).

As regards clinical manifestations, it was observed that all classes of drugs lead to a significant reduction in the PASI score. Therefore, according to the data of this study, the role of SII and SIRI as indicators of response to biological therapy in patients with psoriasis would be of little use in correlating with the extent of skin manifestations.

Another aspect analyzed was the effect of sex on the reduction in SII and SIRI. Our sample was composed of 58 men and 40 women, with a more marked reduction in the inflammatory indexes in male patients. This difference could be due to hormonal, pharmacokinetic, and genetic factors. For example, estrogen influences the inflammatory response, and low levels, such as during menopause, can favor greater inflammation and a reduced response to biological drugs[27]. Furthermore, the greater muscle mass in males could influence the distribution of the drugs. It has been demonstrated that in males with other chronic inflammatory diseases (inflammatory bowel disease, rheumatoid arthritis) the response to TNF-α inhibitors is better than in females, a mechanism that could explain similar differences in psoriasis[28].

Analyzing the impact of comorbidities on the reduction of SII and SIRI, SII showed a significant reduction in all patients with comorbidities, while SIRI showed the greatest decrease in patients with obesity. This finding is consistent with the study by Stienstra et al.[29], which highlights the close relationship between obesity and systemic inflammation. Obesity, like psoriasis, is associated with a chronic inflammatory state, which could explain the marked reduction in inflammatory indices with biological treatment. A significant reduction in SII was also observed in patients with psoriatic arthritis. Psoriatic arthritis is an autoimmune condition characterized by systemic inflammation, and, as suggested by Coates et al.[6], this could be the reason for the response to therapy and the consequent reduction in inflammatory indices. However, compared to obesity, the variability of the response in autoimmune diseases could explain why the reduction of inflammatory parameters is less marked in patients with psoriatic arthritis.

SII and SIRI are recently introduced parameters, with a scarce application in clinical practice. Therefore, a first limitation of this study is represented by the scarcity of studies to refer to and compare with. In addition, since the study is single-center, a second limitation can be identified in the limited sample size under examination. However, given the potential of these parameters, further studies are needed to confirm and improve what we have observed.

Conclusions

Our study investigated the potential role of SII and SIRI as indicators of response to biological therapy in patients with psoriasis. Integrating these biomarkers into clinical practice could optimize the therapeutic management of the disease, improving the care and treatment of patients with psoriasis.

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