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Assessment of Serum Interleukin 23 in Psoriasis Patients before and after Topical Clobetasol Propionate Cream

*Abdelaziz Eltaweel[1], Ranya Adel Lotfi[2], Hend Mohamed Ibrahim[3], Sally Said Hassan Gazia[1]**

[1]*Dermatology, Venereology and Andrology Faculty of Medicine, Banha University, Egypt*

[2]*Dermatology, Venereology and Andrology Faculty of Medicine, Ain Shams University, Egypt*

[3]*Biochemistry, Faculty of Medicine, Tanta University, Egypt*

Abstract

Psoriasis, a chronic inflammatory skin disease, exhibits complex pathogenesis involving interleukin 23 (IL-23) among other factors. Understanding IL-23 dynamics and its response to treatment could provide insights into disease progression and therapeutic interventions. To assess serum IL-23 levels in psoriasis patients before and after topical Clobetasol Propionate cream treatment, examining its association with disease parameters and activity. This Case Control Study was conducted on 60 patients with Psoriasis divided into 2 groups: Pre-Treatment Group: Psoriasis patients who had not yet received treatment for their condition. Post-Treatment Group: Psoriasis patients who had completed a specified treatment regimen by topical Clobetasol Propionate cream. The patients were recruited from Dermatology Outpatient Clinics faculty of medicine October 6 University, during the period from November 2022 to November 2023. Post-treatment, serum IL-23 levels significantly decreased ($p < 0.0001$), contrasting with non-significant changes in other clinical parameters. Quality of life assessments showed no statistically significant changes. The study demonstrated a potential impact of treatment on reducing IL-23 levels, emphasizing its role in psoriasis management. Topical Clobetasol Propionate cream treatment led to a substantial reduction in serum IL-23 levels in psoriasis patients. While other clinical parameters and quality of life measures remained relatively unchanged, the significant decrease in IL-23 post-treatment highlights its potential as a therapeutic target in managing psoriasis.

Keywords: Serum Interleukin 23; Psoriasis; Topical Clobetasol Propionate Cream.

Full length article **Corresponding Author*, e-mail: gazia@fmed.bu.edu.eg

1. Introduction

Idiotic skin diseases are among the most prevalent dermatological conditions. Chronic forms include psoriasis, seborrheic dermatitis, dermatitis (eczema), and rosacea, whereas acute, sporadic rashes accompanied by skin redness and itching occur less frequently. Psoriasis, a prevalent, chronic, mutilating, inflammatory, and proliferative skin condition, is a component of these inflammatory diseases. Important roles are played by both genetic and environmental factors in psoriasis [1]. Psoriasis is a worldwide condition. It impacts nearly every age group, male and female, across all nations, and is not influenced by racial background. From 1979 to 2008, an examination of global prevalence trends reveals that the current prevalence has increased from 4.8% to 11.4%, whereas in developing countries, it is approximately 4.6%, according to research by Parisi R et al.

However, the majority of contributors report that the prevalence in developed countries ranges from 1.5% to 5%. Further evidence supports the notion that the prevalence of psoriasis is increasing. In India, psoriasis is between 0.44 and 2.8% prevalent. 8% is the prevalence in points [2]. Subsequent research, in contrast to earlier studies, proposed that the pathogenesis is facilitated by antigen-presenting cells, natural killer cells, keratinocytes, macrophages, and T cells. Finally, it was postulated that the condition is an immune-mediated disorder characterized by systemic and cutaneous overexpression of several proinflammatory cytokines, primarily type-1 cytokines including IL-2, IL-6, IL-8, IL-12, IFN-gamma, and TNF-alpha. This conclusion was called into question following the identification of IL-23; experimental and clinical evidence subsequently shifted the focus to the IL-23/Th17 axis in psoriasis [3].

The objective of this study was to compare the levels of interleukin 23 in psoriasis patients prior to and following topical Clobetasol Propionatr cream in order to determine its association with disease activity and parameters.

2. Patients and Methods

This Case Control Study was conducted on 60 patients with Psoriasis divided into 2 groups: Pre-Treatment Group: Psoriasis patients who had not yet received treatment for their condition. Post-Treatment Group: Psoriasis patients who had completed a specified treatment regimen by topical Clobetasol Propionate cream. The patients were recruited from Dermatology Outpatient Clinics faculty of medicine October 6 University, during the period from November 2022 to November 2023.

2.1. Inclusion Criteria

Inclusion Criteria were participants with confirmed diagnosis of psoriasis and willingness to provide informed consent.

2.2. Exclusion Criteria

Exclusion Criteria were Participants with Co-existing autoimmune or inflammatory conditions, history of severe infections or immune-related disorders and use of immunosuppressive medications in the past 6 months. All studied cases were subjected to full history taking demographics, Participants' age and gender were recorded to ensure accurate characterization of the study population, medical history assessment, family history and current medications.

2.3. Laboratory Testing

In line with our study's comprehensive methodology, blood samples were systematically collected from participants in both the pre-treatment and post-treatment groups. These blood samples underwent a battery of laboratory tests, aiming to provide a comprehensive insight into various aspects of participants' health profiles and their potential correlation with interleukin 23 (IL-23) levels. These tests included serum IL-23, Complete Blood Count (CBC), Erythrocyte Sedimentation Rate (ESR) and C-Reactive Protein (CRP) Level

2.4. Serum IL-23 Levels

IL-23 levels in participants' serum were measured using validated assays. This assessment was a central aspect of our study, allowing us to investigate the potential link between IL-23 and disease progression, as well as the impact of treatment. The IL-23 measurements were conducted with rigor and precision, enhancing the reliability and robustness of our results.

2.5. Physical Examination

As a critical component of our study's methodology, a thorough physical examination was conducted for each participant in both the pre-treatment and post-treatment groups. This examination focused on evaluating various aspects of joint health and disease progression, particularly in relation to interleukin 23 (IL-23) levels.

2.6. Quality of Life Assessment

A comprehensive evaluation of participants' quality of life was a crucial aspect. This assessment aimed to capture the impact of psoriasis on various facets of daily life, shedding light on the implications of interleukin 23 (IL-23) levels on patients' well-being.

2.7. Statistical analysis

The study utilized IBM SPSS version 20.0 to analyze data, employing various statistical tests. Qualitative data were represented using numbers and percentages, while the Kolmogorov-Smirnov test verified distribution normality. Descriptive statistics such as range, mean, standard deviation, and median were used for quantitative data. Significance was determined at the 5% level. The tests included Chi-square for categorical variables, Mann-Whitney for non-normally distributed quantitative variables, and Two Sample T-test for independent group means. Spearman's correlation examined ranked data relationships, while univariate regression analyzed the impact of cognitive function tests and sleep disorder scales on gender. Multivariate analysis explored relationships between multiple variables simultaneously. R-squared values depicted the explained variance in the dependent variable, and p-values indicated statistical significance. Independent variables were manipulated or controlled for the study's analysis, while dependent variables were the measured outcomes of interest.

3. Results

This study was conducted on 60 patients with Psoriasis divided into 2 groups: Pre-Treatment Group: Psoriasis patients who had not yet received treatment for their condition. Post-Treatment Group: Psoriasis patients who had completed a specified treatment regimen by topical Clobetasol Propionate cream. This study encompasses a diverse range of ages and a balanced representation of both male and female patients, which is important for obtaining more generalized results and conclusions. This information is useful for understanding the characteristics of the patients in your study population and providing context for the subsequent analysis of interleukin 23 levels and treatment outcomes. History data distribution provides insights into the characteristics of the patients in your study in terms of medical history, family history, current medications. This information is valuable for understanding potential factors that could influence the assessment of interleukin 23 levels and treatment outcomes in psoriasis patients before and after treatment (Table 1). The relations between clinical parameters before and after treatment for patients in our study showed nonsignificant differences in Leucocyte, Hemoglobin, Hematocrit, ESR (Erythrocyte Sedimentation Rate) and CRP (C-Reactive Protein) while there was a significant difference in Serum interleukin 23 (Table 2). Only the change in serum interleukin 23 (IL-23) levels is statistically significant between pre-treatment and post-treatment conditions. The p-value for IL-23 is less than 0.0001, indicating a highly significant change (Table 3). The impact of psoriatic arthritis on daily activities did not show a statistically significant change after treatment, as indicated by the p-value (0.8541).

The quality-of-life assessments did not show statistically significant changes after treatment for pain, fatigue, sleep disturbances, and impact on daily activities. It's important to note that while these changes may not be statistically significant, they might still be clinically relevant to patients' well-being. Always consider both statistical and clinical significance when interpreting study results (Table 4).

4. Discussion

In light of the pivotal significance of IL-23 in the aetiology of psoriasis, deliberate therapeutic interventions have been devised to regulate its activities. Biologics, including monoclonal antibodies targeting the IL-23p19 subunit, have demonstrated encouraging outcomes in the treatment of psoriasis joint and skin manifestations. As a result, IL-23 levels in psoriasis patients may provide insight into the progression of the disease, treatment response, and overall disease burden when measured prior to and following treatment [4]. The role of IL-23 in psoriasis has been the subject of numerous studies, which have examined its correlation with disease severity, treatment response, and the quality of life of affected patients. IL-23 has been identified at elevated concentrations in psoriasis patients relative to healthy controls in a number of studies, suggesting that it may serve as a biomarker for disease activity. Furthermore, there is evidence to suggest that IL-23 levels are correlated with the extent of joint involvement in psoriatic arthritis, which underscores its significance within the context of this disease [5-7]. The relationship between IL-23 levels and treatment outcomes, nevertheless, continues to be an area of investigation. Although some studies have reported decreases in IL-23 levels subsequent to effective treatment, conflicting results have been observed in other research. It is crucial to acknowledge that IL-23 represents merely one component of the complex immunopathogenesis underlying psoriasis and psoriatic arthritis. Further investigation is required to determine its exact function in regulating treatment responses [8]. Given the intricacies involved, the objective of our research was to augment the current knowledge base by comparing the concentrations of IL-23 in individuals diagnosed with psoriasis prior to and subsequent to treatment. Through a comprehensive assessment of clinical and quality of life indicators in conjunction with IL-23 concentrations, our objective was to offer a holistic comprehension of the role that IL-23 plays in the progression of diseases and efficacy of treatments. This investigation possesses the capacity to illuminate the potential of IL-23 as both a biomarker and therapeutic target, thereby propelling the field of psoriasis patient management and care forward. Before proceeding with the comprehensive examination of treatment effects and interleukin 23 (IL-23) levels, we outline the demographic distribution of the study population in order to furnish a thorough synopsis of the participants. In addition, Li and colleagues conducted a comprehensive investigation that specifically examined the inflammatory biomarkers, IL-23, CRP, and ESR, in individuals diagnosed with psoriasis. Their findings demonstrated a significant decrease in CRP and IL-23 levels following treatment, in contrast to our results which indicated no significant changes in CRP and ESR. Variations in disease severities, patient populations, or treatment modalities may account for the disparities [9]. When we compare the results of our study to those of the previously mentioned research, we observe a significant difference in the manner in which treatment affects levels of serum interleukin 23 (IL-23). A significant drop in IL-23 concentrations was observed in our study subsequent to treatment (p-value < 0.0001), which is consistent with the findings reported by Mahil et al., (2017). This agreement implies that the therapeutic strategy utilized in our research precisely focused on the dynamics of IL-23, resulting in a significant decrease in its levels [10]. To provide additional context for our findings, we refer to other pertinent research that has investigated the levels of IL-23 in individuals with psoriasis. In a cohort of eighty psoriasis patients, Kim and Krueger (2015) compared IL-23 levels prior to and following treatment in a comparable study. The authors documented a significant decrease in IL-23 concentrations subsequent to undergoing biological therapy, which is consistent with the hypothesis that treatment may influence the dynamics of IL-23 [11]. Another investigation conducted by Chiricozzi et al., (2014) examined the correlation between psoriasis patients' IL-23 levels and the severity of their disease. Elevated concentrations of IL-23 were observed to be associated with more severe manifestations of the disease, underscoring the potential prognostic value of IL-23 as a biomarker [12]. On the contrary, Lowes et al., (2014) noted negligible variations in IL-23 concentrations among their cohort of psoriasis patients prior to and subsequent to treatment. Variations in treatment modalities, disease duration, or patient characteristics between studies could account for this difference [13]. When comparing our results to those of the aforementioned studies, we find that IL-23 levels in psoriasis patients decreased significantly following treatment. The observed decrease indicates that the treatment protocol employed in our research successfully targeted pathways related with IL-23, which may have played a role in ameliorating the symptoms of psoriasis. The divergent results noted in the alternative investigations could potentially be ascribed to differences in therapeutic approaches, patient cohorts, or the particular cytokine quantification techniques utilized. A balanced gender distribution and a wide range of ages are characteristics of the psoriasis patient population under investigation, according to demographic data. The interpretation of subsequent IL-23 level analyses and treatment outcomes is enhanced by this context. We establish a basis for discussing the significance of our findings by comparing them to prior research, which underscores the potential impact of treatment strategies on the dynamics of IL-23 in patients with psoriasis. In a study employing a similar design, Yoon et al., (2016) compared the concentrations of interleukin 23 (IL-23) in individuals diagnosed with psoriasis prior to and following treatment. A significant decrease in IL-23 levels was noted following treatment, suggesting that IL-23 may play a role in the development of psoriasis and that the treatment method utilized was effective [14]. In a cohort of psoriasis patients, Eberle et al., (2016) investigated the correlation between IL-23 levels and disease severity. Higher IL-23 levels were associated with more severe disease manifestations, suggesting that IL-23 may be a useful prognostic indicator in the management of psoriasis [15].

Table 1: Demographic and History data distribution in all study population.

	All Patients
	N=60
Age	
Mean± SD	45.07±17.46
Range (Min-Max)	12-75
Sex	
Male	29(48.33%)
Medical history	
Family history	
No	29(48.33%)
Yes	31(51.67%)
Current medications	
No	27(45%)
Yes	33(55%)

Table 2: Relations between Clinical Parameters before and after treatment.

Clinical Parameters	**Pre-Treatment**	**Post-Treatment**	**P value**	**Statistically significant**
	N=60	**N=60**		
CBC				
Leucocyte	7677±1439	7707±1441	0.9108	N. S
Hemoglobin	12.86±1.12	12.96±1.15	0.6385	N. S
Hematocrit	39.54±3.8	39.73±3.7	0.7788	N. S
ESR	18.8±11.56	21.22±11.72	0.2578	N. S
CRP	23.03±22.74	27.2±23.2	0.2698	N. S
Serum interleukin 23 (IL-23) pg/Ml	143.13±35.32	72.35±18.29	<0.0001	Sig.
Statistical test used: Tow sample T-test				
p-value≤0.05 considered statistically significant (95% confidence interval).				

Table 3: Serum interleukin 23 (IL-23) Pg/MI.

Clinical Parameters	**Pre-Treatment**	**Post-treatment**	**P value**	**Statistically significant**
Serum interleukin 23 (IL-23) pg/MI	143.13±35.32	72.35±18.29	<0.0001	Sig.
Statistical test used: Tow sample T-test				
p-value≤0.05 considered statistically significant (95% confidence interval).				

Table 4: Relations between Quality-of-life assessment before and after treatment.

Quality of life assessment	Pre-Treatment	Post-Treatment	P value	Statistically significant
	N=60	N=60		
Pain				
No	28(46.67%)	29(48.33%)	0.855	N. S
Yes	32(53.33%)	31(51.67%)		
Fatigue				
No	32(53.33%)	30(50%)	0.7148	N. S
Yes	28(46.67%)	30(50%)		
Sleep disturbances				
No	27(45%)	32(53.33%)	0.3612	N. S
Yes	33(55%)	28(46.67%)		
Impact of psoriatic arthritis on daily activities				
No	27(45%)	26(43.33%)	0.8541	N. S
Yes	33(55%)	34(56.67%)		
Statistical test used: Chi-Square test				
p-value≤0.05 considered statistically significant (95% confidence interval).				

On the contrary, Wang et al., (2013) documented negligible variations in IL-23 concentrations in their cohort of psoriasis patients prior to and following treatment. The observed discrepancy may be ascribed to variations in therapeutic approaches or the particular demographic of patients, thereby illuminating the intricate nature of IL-23 modulation in psoriasis [16]. When examining the outcomes of our research in relation to the aforementioned studies, we found that treatment led to a significant decrease in IL-23 levels, which is consistent with the conclusions developed by Fotiadou et al., (2018) [17]. The observed pattern of consistent results indicates that interventions that specifically target IL-23 could potentially have a significant impact on the improvement of psoriatic conditions [17]. The congruence between our findings and those of Wang et al., (2013) may suggest that personal medical histories, familial predispositions, and prior treatments may impact IL-23 levels and their subsequent modulation. Gaining insight into the intricate relationship between these variables and the dynamics of IL-23 can be beneficial in forecasting responses to treatments and customizing therapeutic strategies for individuals afflicted with psoriasis [16].

5. Conclusions

In psoriasis patients, topical Clobetasol Propionate cream treatment significantly decreased serum IL-23 levels. Although there were no notable changes observed in other clinical parameters or quality of life indicators, the significant decrease in IL-23 following treatment underscores its potential as a therapeutic target in the management of psoriasis.

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