

The Effect of Excimer Laser Combined with Secukinumab on Patients with Psoriasis and Its Influence on IL-2, IL-17, and IFN- γ : A Study

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Objective: To explore the efficacy of excimer laser combined with scolimumab in psoriasis patients and its effects on interleukin-2, 17 (IL-2, 17), and interferon- γ (IFN)- γ The influence of level.

Method: 94 psoriasis patients from June 2021 to September 2023 were selected as the subjects, and were divided into two groups using envelope method, with 47 cases in each group. Both groups were treated with Avia capsules, while the control group was treated with a combination of escuzumab and the observation group was treated with excimer laser. Both groups were treated for 12 weeks, and the skin lesion severity score (PASI), skin barrier function, quality of life, IL-2, IL-17, and IFN were compared between the two groups- γ And the incidence of adverse reactions.

Result: After 12 weeks of intervention, the scores of the head, torso, upper limbs, and lower limbs in the observation group were lower than those in the control group ($P < 0.05$); After 12 weeks of intervention, the water content of the stratum corneum and cortex in the observation group were higher than those in the control group ($P < 0.05$); The DLQI score was lower than that of the control group ($P < 0.05$); After 12 weeks of treatment, the inflammatory factors in the patient's body decreased in both groups; Observation group IL-2, IL-17, IFN- γ The level was lower than that of the control group ($P < 0.05$); There was no statistically significant difference in the incidence of adverse reactions between the two treatment groups ($P > 0.05$).

Conclusion: The combination of excimer laser and situximab can reduce the severity of skin lesions in psoriasis patients, improve skin barrier level and quality of life, and reduce IL-2, IL-17, and IFN- γ High level and high safety, worthy of promotion and application.

Keywords. Excimer laser; Secukinumab; Psoriasis; Interleukin-2; Interleukin-17; Interferon- γ

INTRODUCTION

As a skin disease with high clinical incidence, psoriasis is mostly stimulated by environmental factors, controlled by polygenic genetics and mediated by immunity [1]. Guan Xin et al. [2] showed that the pathogenesis of psoriasis is complex, and the lesion can be limited to one site or widely distributed throughout the body. Some patients are accompanied by joint symptoms, and severe cases will cause metabolic syndrome. As a human monoclonal antibody, secukinumab can neutralize interleukin-17A (IL-17A) and improve the condition of skin lesions in patients with psoriasis [3]. As a non-drug intervention method, excimer laser can adjust the spot size according to the size of the lesion and act on T cells to induce automatic apoptosis of T cells [4]. However, there are few studies on the effects of the above two treatments on the levels of interleukin-2, 17 (IL-2, 17) and interferon- γ (IFN- γ) in patients with psoriasis [5]. This study mainly discusses the effect of excimer laser combined with secukinumab in the treatment of psoriasis, which is reported as follows.

MATERIALS AND METHODS

1.1 General Information

A total of 94 patients with psoriasis from June 2021 to September 2023 were selected and divided into two groups by envelope method. There were 47 patients in the control group, 29 males and 18 females, aged from 24 to 67 years, with an average age of (48.29 ± 6.42) years. Body mass index (BMI) was $(18.7-29.3)$ kg/m², average (22.16 ± 2.52) kg/m²; The disease duration was (1-13) years with an average of (5.29 ± 0.75) years. The lesions located at upper limbs in 23 cases, lower limbs in 20 cases, and trunk in 4 cases. There were 47 cases in the observation group, 31 males and 16 females, aged (26-69) years, with an average age of (49.16 ± 6.47) years. BMI $(18.9-29.7)$ kg/m², average (22.31 ± 2.59) kg/m²; The disease duration was (1-12)

years, with an average of (5.41 ± 0.79) years. The lesions located at upper limbs in 21 cases, lower limbs in 21 cases, and trunk in 5 cases. The study was approved by the hospital ethics committee, and the patients signed the consent form. There was no significant difference in general data between the two groups ($P > 0.05$).

1.2 Inclusion and exclusion criteria

Inclusion criteria: (1) All patients with psoriasis [6] were admitted to our hospital, and the affected body surface area was $>3\%$; (2) Psoriasis area and severity index (PASI) ≥ 30 points, all were the first attack; (3) There were no contraindications to excimer laser and secukinumab. Exclusion criteria: (1) patients with other skin diseases and severe liver and kidney dysfunction; (2) with autoimmune diseases and acute advanced cases; (3) pregnant, lactating and active infection.

1.3 Methods

Both groups were treated with acitretin capsule (Chongqing Huabang Pharmaceutical Co., LTD., Chinese Medicine approval number H20010126, standard: 10mg), the initial dose was 20mg each time, oral medication, for no adverse reactions, after 1 week, the drug dose was increased to 30mg, when the skin lesions subsided, the drug dose was reduced to 20mg, continuous treatment for 12 weeks; Control group: combined with secukinumab treatment. The induction therapy was started at 0-4 weeks after admission. Subcutaneous injection of secukinumab (Novartis Pharma Schweiz AG, SJ20225002, 1ml:150mg) was given once a week in two doses of 300mg, and the injection was avoided as much as possible at the site of skin lesions. Four weeks after the induction treatment, the patients were treated with 300mg each time for 12 weeks (1 course).

The observation group was treated with excimer laser. 308nm excimer laser instrument, model: XECL-308, purchased from Chongqing Dema Photoelectric Technology Co., LTD. All patients were treated with 308nm excimer laser twice a week. The minimum erythema dose (MED) was measured before irradiation. For patients with erythema, the last MED dose was reduced by 10.0%. Patients with painful erythema or blisters stopped treatment 1-2 times, and both groups were treated for 12 weeks.

1.4 Indicators of observation

(1) PASI. Before the intervention and 12 weeks after the intervention, the two groups were evaluated by the PASI scale from the head, trunk, upper limbs and lower limbs in four dimensions, each including 0-6 points in area and 0-4 points in severity, the lower the score, the better [7]. (2) skin barrier function and quality of life; Before intervention and 12 weeks after intervention, the non-invasive skin detection system was used to detect the water content of stratum corneum and cortical content [8]. Dermatology Life Quality Index (DLQI) was used to evaluate the quality of life of patients, with a total score of 30 points, and the higher the score, the worse the quality of life [9]. (3) Inflammatory factors. The levels of IL-2, IL-17 and IFN- γ were measured by enzyme-linked immunosorbent assay before intervention and 12 weeks after intervention in the two groups [10]. (4) Adverse reactions. The incidences of upper respiratory tract infection, back pain, pharyngitis, dry skin and pruritus were recorded.

1.5 Statistical Analysis

SPSS26.0 software was used to process the data. The enumeration data were analyzed by χ^2 test, expressed by n (%), and the measurement data were analyzed by t test, expressed by $(\bar{x} \pm s)$, $P < 0.05$ was statistically significant.

RESULTS

2.1 Comparison of PASI between the two groups

After 12 weeks of intervention, the area of psoriasis lesions was reduced and the severity was reduced in the two groups. The scores of head, trunk, upper limbs and lower limbs in the observation group were lower than those in the control group ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of PASI between the two groups (score, $\bar{x} \pm s$)

Groups	Point of time	Head	Trunk	Upper limbs	Lower limbs
Observation group (n=47)	Before intervention	8.52 ± 1.14	7.41 ± 0.97	9.36 ± 1.31	6.73 ± 0.78
	After 12 weeks of intervention	3.14 ± 0.62 ^{#*}	3.05 ± 0.56 ^{#*}	3.31 ± 0.59 ^{#*}	2.62 ± 0.45 ^{#*}
Control group (n=47)	Before intervention	8.54 ± 1.16	7.44 ± 1.02	9.39 ± 1.34	6.75 ± 0.80
	After 12 weeks of intervention	6.21 ± 0.97 [*]	5.63 ± 0.86 [*]	6.73 ± 0.93 [*]	4.41 ± 0.62 [*]

Compared with the control group, [#]P<0.05; Compared with that before intervention, ^{*}P<0.05

2.2 Comparison of skin barrier function and DLQI between the two groups

After 12 weeks of intervention, the skin barrier function was improved and the quality of life was improved in the two groups. The water content of stratum corneum and cortex in the observation group were higher than those in the control group (P<0.05). The DLQI score was lower than that of the control group (P<0.05), as shown in Table 2.

Table 2 Comparison of skin barrier function and DLQI between the two groups ($\bar{x} \pm s$)

Groups	Number of cases	Stratum corneum water content (%)		Cortical content ($\mu\text{g}/\text{cm}^2$)		DLQI (score)	
		Before intervention n	After 12 weeks of intervention n	Before intervention n	After 12 weeks of intervention n	Before intervention n	After 12 weeks of intervention n
Observation group	47	33.69 ± 4.31	54.13 ± 5.83 [#]	53.69 ± 4.34	140.29 ± 13.69 [#]	18.63 ± 2.19	8.21 ± 0.78 [#]
Control group	47	33.71 ± 4.33	45.29 ± 5.14 [#]	53.71 ± 4.37	102.64 ± 9.53 [#]	18.65 ± 2.21	12.66 ± 1.53 [#]
t	/	0.078	7.734	0.571	15.697	0.083	4.121
P	/	0.793	0.000	0.545	0.000	0.672	0.000

Compared with before intervention, [#]P<0.05.

2.3 The inflammatory factors were compared between the two groups

After 12 weeks of treatment, the inflammatory factors in the two groups decreased. The levels of IL-2, IL-17 and IFN- γ in the observation group were lower than those in the control group ($P < 0.05$), as shown in Table 3.

Table 3 Comparison of inflammatory factors between the two groups ($\bar{x} \pm s$)

Groups	Number of cases	IL-2 (pg/mL)		IL-17 (pg/mL)		IFN- γ (pg/mL)	
		Before intervention	After 12 weeks of intervention	Before intervention	After 12 weeks of intervention	Before intervention	After 12 weeks of intervention
		n	n	n	n	n	n
Observation group	47	35.85 \pm 4.39	18.32 \pm 2.16 [#]	15.56 \pm 0.73	8.24 \pm 0.41 [#]	45.75 \pm 4.29	21.32 \pm 3.28 [#]
Control group	47	35.87 \pm 4.41	23.27 \pm 3.53 [#]	15.58 \pm 0.76	12.63 \pm 0.62 [#]	45.77 \pm 4.32	34.26 \pm 4.15 [#]
t	/	0.152	5.561	0.098	6.452	0.091	6.693
P	/	0.569	0.000	0.773	0.000	0.867	0.000

Compared with before intervention, # $P < 0.05$.

2.4 The adverse reactions of the two groups were compared

There was no significant difference in the incidence of adverse reactions between the two groups ($P > 0.05$), as shown in Table 4.

Table 4 Comparison of adverse reactions between the two groups [n (%)]

Groups	Number of cases	Upper respiratory tract infection (URTI).	Back pain	Sore throat	Dry skin	Itching	Incidence rate
Observation group	47	0 (0.00)	1 (2.13)	0 (0.00)	1 (2.13)	1 (2.13)	3 (6.38)
Control group	47	1 (2.13)	1 (2.13)	1 (2.13)	1 (2.13)	1 (2.13)	5 (10.64)
χ^2	/						0.547
P	/						0.460

3 DISCUSSION

The pathogenesis of psoriasis is complex and related to genetic, psychiatric and infectious factors, which leads to the activation of the patient's immune system, resulting in abnormal expression of T lymphocytes, accelerating epidermal growth and causing excessive cell proliferation [11]. Psoriasis has a long course and is clinically manifested as burning, pain and itching, which affect the appearance and health of patients. In this study, the scores of head, trunk, upper limbs and lower limbs in the observation group were lower than those in the control group after 12 weeks of intervention ($P<0.05$). After 12 weeks of intervention, the water content of stratum corneum and cortex in the observation group were higher than those in the control group ($P<0.05$). The DLQI score of the excimer laser combined with secukinumab was lower than that of the control group ($P<0.05$). From the results, excimer laser combined with secukinumab can reduce the severity of skin lesions in patients with psoriasis, improve the skin barrier function of patients, improve the quality of life of patients, and facilitate the recovery of patients. Analysis of reasons: As a commonly used western medicine for the treatment of psoriasis, secukinumab can specifically inhibit IL-17A binding to IL-17A receptors indicated by osteoblasts, chondrocytes, and endothelial cells, and relieve systemic and skin symptoms of patients with psoriasis. Yu et al. [12] showed that secukinumab can bind to IL-17 target with high selectivity, inhibit the levels of IL-17 and IL-17 receptor, and achieve the treatment of disease. Excimer laser was first used in patients with localized psoriasis in 1997, which can target T lymphocytes and play a role by inducing T cell apoptosis and inhibiting cytokine production [13].

The known susceptibility genes of psoriasis are related to antigen presentation and processing, IL-2, IL-17, IFN- γ and other inflammatory factors, which can directly participate in the occurrence and development of the disease. IL-17 is a key mediator of inflammation, which is secreted by a variety of immune cells in the human body. However, in patients with psoriasis, IL-17 is mainly derived from hypertrophy and neutrophils, and its level can reflect the severity of the disease [14]. IFN- γ is mainly produced by activated T cells, and its elevated level can promote Th1 differentiation,

cause abnormal proliferation of skin keratinocytes, and aggravate inflammatory cell infiltration. IL-2 can promote the proliferation of keratinocytes, induce and enhance cytotoxicity, thereby promoting the imbalance of cytokines in the body [15]. In this study, the inflammatory factors in the two groups decreased after 12 weeks of treatment; The levels of IL-2, IL-17 and IFN- γ in the observation group were lower than those in the control group ($P < 0.05$). There was no significant difference in the incidence of adverse reactions between the two groups ($P > 0.05$). According to the results, excimer laser combined with secukinumab can reduce the levels of IL-2, IL-17 and IFN- γ in patients with psoriasis without increasing the incidence of adverse reactions. Excimer laser combined with secukinumab in the treatment of psoriasis can play the advantages of two treatment methods, which can regulate the downstream of signal transduction pathways and play a role in the regulation of inflammation.

In conclusion, excimer laser combined with secukinumab can reduce the severity of skin lesions in patients with psoriasis, improve the skin barrier level and quality of life, reduce the levels of IL-2, IL-17 and IFN- γ , and has high safety, which is worthy of promotion and application.

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