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The Application of Photorejuvenation in the Treatment of Skin Beauty Patients

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Abstract: *Objective:* To explore the application effect of photorejuvenation in the treatment of skin beauty patients. *Methods:* 100 skin beauty patients admitted to our hospital from January 2022 to December 2023 were selected as research subjects. They were divided into a conventional group and a photon group using a random number table method, with 50 cases in each group. The conventional group used traditional skin care treatment and the photon group used photon skin rejuvenation treatment. The skin condition scores, total treatment efficiency, and incidence of adverse reactions were compared between the two groups before and after treatment. *Results:* After treatment, the skin condition score of the photon group was lower than that of the conventional group, the total effective rate of treatment was higher than that of the conventional group, and the incidence of adverse reactions was lower than that of the conventional group ($p < 0.05$). *Conclusion:* Photorejuvenation has significant effects when used in the treatment of skin beauty patients, can improve skin conditions and is highly safe.
Keywords: Photorejuvenation; Skin beauty; Treatment effect; Skin condition; Adverse reactions

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1. Introduction

As people's living standards improve and people pay more and more attention to beauty, skin beauty has become something that many people care about. As the largest organ of the human body, skin not only protects the body, but also reflects a person's image and health. However, due to various factors such as aging, sun exposure, and lifestyle habits, skin problems such as spots, wrinkles, telangiectasia, and rough skin are becoming more and more common [1]. These problems not only make people feel unsightly, but may also cause psychological stress and even affect normal social interactions and life. Most traditional skin care treatments, such as skin care products, facial masks and basic care, can only act on the surface of the skin. They have no obvious effect on deep skin problems and are slow to show results. They cannot meet people's needs for quickly and effectively improving skin conditions. Although some invasive cosmetic surgeries have relatively obvious effects, they have problems such as large trauma, long recovery time and high risks, which makes many people afraid to try them. Photorejuvenation is a new skin beauty technology that does not require surgery. Since its emergence, it has been used more and more clinically because it is safe, effective and convenient. It uses strong pulsed light to penetrate deep into the skin and specifically act on subcutaneous pigments or blood vessels to break down stains and close abnormal capillaries. It can also stimulate the growth of collagen to improve the texture and appearance of the

skin. Compared with traditional treatment methods, photorejuvenation can solve more skin problems, has less trauma, faster recovery and fewer side effects. It can treat telangiectasia, fine wrinkles and skin sagging. Therefore, this study mainly wants to compare the application effects of photorejuvenation and traditional skin care treatments in skin beauty patients.

2. Materials and methods

2.1. General information

Select 100 skin beauty patients admitted to our hospital from January 2022 to December 2023 as cases, and divide them into a conventional group and a photon group using the random number table method, with 50 cases in each group. The age of the conventional group ranged from 18 to 55 (32.56 ± 6.32) years old, including 20 cases of stains, 15 cases of wrinkles, and 15 cases of telangiectasias; the age group of the photon group ranged from 19 to 54 (31.89 ± 5.98) years old, including 18 cases of stains, 16 cases of wrinkles, and 16 cases of telangiectasia. There is no statistical significance in the comparison of general data ($p > 0.05$).

2.1.1. Inclusion criteria

(1) There are obvious skin cosmetic problems;
(2) Voluntary participation in this study;
(3) No serious skin diseases.

2.1.2. Exclusion criteria

(1) Skin allergies;
(2) Pregnant or lactating women;
(3) Recently received other skin beauty treatments.

2.2. Method

The conventional group was treated with traditional skin care methods, which included instructing patients to apply medical moisturizing skin care products containing ceramide and hyaluronic acid every morning and evening that can enhance the skin barrier function. It was recommended that patients use sun protection and apply SPF30+, PA+++ or above sunscreen when going out, and take sun protection measures such as wearing a sun hat and umbrella. At the same time, patients were given basic skin care such as deep cleansing and hydration once a week to remove skin oil and aging cutin.

The photon group uses photon rejuvenation treatment. Specifically, before treatment, the patient's facial skin was cleaned with mild cleansing products to remove surface dirt and cosmetic residues, and then the patient was asked to wear professional light-blocking protective glasses to protect the eyes from being irritated by strong light. The doctor inquires in detail about the patient's skin allergy history and recent medication use, and adjusts the parameters of the photorejuvenation instrument (Scientist M22) such as wavelength, pulse width and energy density according to the patient's skin type (dry, oily, mixed) and problems. Generally, the wavelength is 560–1200 nm, the energy density was set to 20–40 J/cm^2 according to the skin's tolerance, and the pulse width was adjusted to 3–6 ms.

2.2.1. Treatment process

Gently touch the treatment head of the photorejuvenation device to the patient's skin and apply an appropriate amount of coupling agent to reduce light reflection and protect the skin. Treat the cheeks first, then forehead, mandible and neck, and irradiate each area evenly 3–5 times to ensure uniform treatment. During the treatment process, the patient's response was closely observed and if the patient experiences pain and discomfort, the energy density was appropriately reduced or the

treatment can be suspended until the patient adapts before continuing.

2.2.2. Post-treatment care

Immediately after treatment, apply a medical ice mask on the patient's face for 15–20 minutes to reduce skin redness, swelling and burning sensation; inform the patient to avoid using skin care products and cosmetics containing irritating ingredients such as alcohol and acids within 1 week after treatment, and to keep the skin clean and dry; add Strong sun protection measures must be taken to avoid direct sunlight, and SPF50+ sunscreen must be applied, and a hat and umbrella must be worn when going out. Patients were advised to drink more water and eat more fruits and vegetables rich in vitamin C and vitamin E, such as oranges, kiwis, and spinach, and to avoid spicy foods, tobacco and alcohol.

2.2.3. Treatment frequency

One treatment was performed every 3–4 weeks and a total of 5–6 treatments were performed. The patient's skin reaction and recovery are recorded after each treatment.

2.3. Observation indicators

Compare the skin condition scores of the two groups before and after treatment (scored in terms of spots, wrinkles and telangiectasia and the higher the score, the worse the condition), the total effective rate of treatment (markedly effective: skin problems are significantly improved; effective: skin problems are improved; ineffective: skin problems do not change or worsen and markedly effective + effective = total effective) and the incidence of adverse reactions (redness, itching, pigmentation).

2.4. Statistical methods

Data were analyzed using SPSS22.0. *t*-test for measurement data; χ^2 test for count data. $p < 0.05$ represents significant difference.

3. Results

3.1. Comparison of skin condition scores between the two groups

There was little difference in skin condition scores between the two groups before treatment ($p > 0.05$); after treatment, the skin condition scores of the photon group were lower than those of the conventional group ($p < 0.05$), see **Table 1**.

Table 1. Comparison of skin condition scores between the two groups ($\bar{x} \pm s$, points)

Group	Pre-treatment score	Post-treatment score
Regular group (50)	8.65 ± 1.32	6.23 ± 1.15
Photon group (50)	8.72 ± 1.28	3.15 ± 0.98
t	0.269	14.414
p	0.788	0.000

3.2. Comparison of the total effective rate of treatment between the two groups

The total effective rate of treatment in the photon group was higher than that in the conventional group ($p < 0.05$), see **Table 2**.

Table 2. Comparison of the total effective rate of treatment between the two groups [n (%)]

Group	Effective	Efficient	Invalid	Total valid [n (%)]
Regular group (50)	10 (20.00)	20 (40.00)	20 (40.00)	30 (60.00)
Photon group (50)	25 (50.00)	20 (40.00)	5 (10.00)	45 (90.00)
χ^2				12.000
p				0.001

3.3. Comparison of the incidence of adverse reactions between the two groups

The incidence of adverse reactions in the photon group was lower than that in the conventional group ($p < 0.05$), see **Table 3**.

Table 3. Comparison of the incidence of adverse reactions between the two groups [n (%)]

Group	Redness and swelling	Itching	Pigmentation	Overall incidence rate [n (%)]
Regular group (50)	5 (10.00)	4 (8.00)	3 (6.00)	12 (24.00)
Photon group (50)	2 (4.00)	1 (2.00)	0 (0.00)	3 (6.00)
χ^2				6.353
p				0.012

4. Discussion

There are many types of skin problems involved in skin beauty, such as spots, wrinkles and telangiectasias. The causes of these problems are complex and diverse [2]. The formation of stains is mostly related to the activity of melanocytes and increased melanin synthesis. Ultraviolet radiation will stimulate melanocytes to produce more melanin. Endocrine disorders such as changes in hormone levels during pregnancy and menopause may also induce or aggravate stains. Genetic factors make some people more prone to freckles and other stains. The appearance of wrinkles is closely related to the loss of skin collagen, rupture of elastic fibers, and skin laxity. Aging is the main reasons are that staying up late for a long time will affect skin metabolism and repair. Smoking will cause skin hypoxia and collagen denaturation. These bad living habits will accelerate the production of wrinkles. Telangiectasia is mainly due to the thinning of the skin's stratum corneum and the reduction of capillary wall elasticity, making blood vessels easy to expand and exposed. People with sensitive skin are more sensitive to external stimuli. Long-term wind and sun exposure will damage the skin barrier, leading to telangiectasia. These skin problems not only affect the appearance but may also reflect the health status of the body. Long-term existence will cause varying degrees of psychological distress to patients and reduce their life satisfaction. As an advanced skin beauty treatment, photorejuvenation works based on the selective photothermal effect of intense pulsed light. This feature enables it to accurately act on target tissues at different levels of the skin without damaging surrounding normal tissues. When treating spots, intense pulsed light is absorbed by melanin and converted into heat energy, causing the pigment particles to be heated and broken, and then cleared by phagocytes in the human immune system, thereby achieving the effect of lightening the spots. For shallow spots such as freckles and age spots, the treatment effect is particularly significant due to the shallow location of the pigment particles, and can usually be significantly lightened after several treatments. For deeper spots such as chloasma, because the causes are complex and related to endocrine and other factors, better improvements can be achieved by adjusting parameters through multiple treatments. For telangiectasia, strong pulsed light can coagulate hemoglobin in blood vessels, causing blood vessel occlusion, and is gradually absorbed by the body, thus improving the condition of red skin and obvious red blood streaks. For capillaries

of different diameters, targeted treatment can be achieved by adjusting the wavelength and energy [3,4]. At the same time, intense pulsed light can also penetrate into the dermis of the skin, stimulate fibroblast activity, promote the proliferation and rearrangement of collagen and elastic fibers, increase the thickness and elasticity of the skin, effectively reduce fine wrinkles, improve skin sagging, and make the skin firmer and smoother. This effect on the deep layers of the skin is difficult to achieve with traditional skin care.

The results of this study show that after photon rejuvenation treatment, the skin condition score of the photon group was lower than that of the conventional group, the total treatment effectiveness was higher than that of the conventional group, and the incidence of adverse reactions was lower than that of the conventional group. This fully demonstrates that photon rejuvenation has significant advantages in the treatment of skin beauty patients. From the perspective of treatment effect, photorejuvenation can improve skin problems from multiple dimensions. It can not only effectively fade spots and reduce telangiectasia, but also reduce wrinkles and improve skin texture. This is because it has a wide range of effects and can penetrate deep into the skin. However, traditional skin care treatments are mostly limited to the surface layer of the skin and are difficult to reach deep-seated problems, so the effect is relatively limited. Although the skin care products used in the conventional group can moisturize and moisturize the skin to a certain extent, they cannot decompose deep pigments and stimulate collagen regeneration, and have a weak effect on improving obvious skin problems. In terms of safety, photorejuvenation is a non-invasive treatment technology that does not require surgery. It causes minimal trauma to the skin during the treatment process and allows for quick recovery after surgery. The adverse reactions in the photon group in this study were mainly temporary redness, swelling and slight itching, and the incidence was low. They could be quickly relieved with appropriate postoperative care such as cold compress and sun protection, and no serious complications occurred. This is due to the fact that the energy parameters can be accurately adjusted according to the patient's skin condition during photorejuvenation treatment. The doctor will conduct a spot test before treatment and observe the skin reaction before determining the appropriate energy, thus avoiding damage to the skin caused by over-treatment. In traditional skin care treatments, some patients may suffer from skin irritation, allergies and other adverse reactions due to allergies to skin care product ingredients or improper use. In addition, due to the lack of professional guidance, patients may blindly use a variety of skin care products, increasing the risk of adverse reactions. The relatively high incidence of adverse reactions in the conventional group also confirms this [5,6].

Judging from clinical application experience, photorejuvenation treatment has the following advantages: First, it is applicable to a wide range of people. Whether young people have spots and acne caused by ultraviolet exposure and irregular life, or middle-aged and elderly people have wrinkles, loose skin and other problems due to age, they can all be improved to a certain extent through photorejuvenation. Patients with different skin types can also get suitable treatment through parameter adjustment; second, after treatment. The process is convenient, and each treatment time is short, usually about half an hour. Patients can do it as they go, without affecting their normal work and life. It is easy to be accepted by patients and is especially suitable for people with busy work. Third, the effect is long-lasting. After one course of treatment, the skin condition can be significantly improved, and with daily care and sun protection, the effect can last for a long time. Compared with some beauty projects that need to be performed frequently, it is more cost-effective. During the treatment process, the doctor's operating experience is also crucial. Accurately judging the patient's skin type and problems and setting treatment parameters reasonably can effectively improve the treatment effect and reduce the risk of adverse reactions. An experienced doctor can adjust the treatment plan according to the patient's immediate response. At the same time, care guidance after treatment cannot be ignored. Informing patients of precautions and urging them to take sun protection, moisturizing and other care can promote skin repair and recovery and consolidate the treatment effect. Many patients recover faster and have more stable effects because they pay attention to postoperative care [7,8]. Compared with other skin beauty treatments, photorejuvenation combines the advantages of safety and effectiveness. Compared with invasive cosmetic surgeries such as facelift surgery, it avoids surgical risks and a long recovery period, and has fewer postoperative complications; compared with treatments such as chemical peels, it is less irritating to the skin, has a wider range of applications, and will not cause serious damage to the skin barrier like chemical peels. Clinically, many

patients who have received photorejuvenation treatment have improved their skin condition and strengthened their self-confidence. They are more active in socializing and have a higher quality of life. Some patients say that after treatment, their skin is smoother and more delicate, with fewer spots, and they look younger and more energetic. Such good changes have also improved their mental state. Moreover, photorejuvenation can be used together with other cosmetic treatments, and the effect will be better. For example, patients with complex skin problems can use water-light needle injections to replenish skin moisture during photorejuvenation, or use it with fruit acid peels to improve skin roughness. This solves skin problems from multiple aspects and can make the cosmetic effect more obvious. However, combined treatment must be carried out under the guidance of a professional doctor, and a suitable treatment plan must be determined according to the patient's specific situation to avoid superposition of adverse reactions [9–11].

In general, photorejuvenation is very effective in skin beauty treatment. It can effectively improve the patient's skin condition, increase the overall efficiency of treatment, and has few adverse reactions. It is a safe and effective skin beauty treatment method that deserves to be widely used in clinical practice. It has helped many patients who are troubled by skin problems and also provides a reliable treatment method in the field of skin beauty.

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Disclosure statement

The author declares no conflict of interest.

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