

# *Progress of External Treatment of Melasma*

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**Abstract:** Melasma is a common acquired, disfiguring, and pigmented disease of the face, which is mainly manifested as yellow-brown or light black patches of different shades of color and well-defined borders. The etiology of the disease is complex and not fully understood, and it is widely believed to be mainly related to abnormal skin melanin metabolism and local inflammatory response, and the course of the disease is long, clinically refractory, and easy to recur, which often has a negative impact on the physical and mental health and daily life of patients. In recent years, the external treatment methods of melasma have become more and more abundant, and the development of traditional Chinese medicine has greatly enriched its treatment content, and these treatment methods have been proven to be effective through a large number of clinical experiments. By reading a large number of relevant literatures, this paper summarizes these methods from three aspects: external treatment of traditional Chinese medicine, external treatment of Western medicine, and external treatment of integrated traditional Chinese and Western medicine.

## 1. Introduction

Chloasma, also known as “liver spots” and “butterfly spots”, equivalent to “sallow spots” in Chinese medicine, is a common pigmentation skin disease [1], mainly manifested as varying shades of yellow-brown or light-black patches with clear borders, seriously affecting patients' aesthetics and mental health. It is a common pigmentation skin disease [1], which is mainly characterized by yellow-brown or blackish patches with different shades and clear boundaries, which seriously affects the patients' aesthetics and mental health. At present, the etiology of melasma has not been fully elucidated, and it is believed that the pathogenesis of melasma is mainly related to abnormalities in melanin metabolism and local inflammatory reactions, and is closely related to factors such as genetic susceptibility, exposure to sunlight, and changes in the level of sex hormones [2]. The disease has a long course and is difficult to treat. This paper summarizes the treatment methods of melasma from three perspectives: external treatment of Western medicine, external treatment of Chinese medicine, and combination of Chinese and Western medicine by collating a large amount of literature.

## 2. External Treatment by Western Medicine/Western External Treatment

### 2.1. Chemical Blemish Removal

Chemical blemish removal mainly utilizes topical medications to make the skin's surface stratum corneum shed, accelerating the renewal of skin cells, thus reducing the phenomena of skin dullness and pigmentation. Commonly used drugs include fruit acid, squalane acid, salicylic acid, etc. These drugs can promote the shedding of keratinocytes, so that the newborn cells gradually replace the old cells, thus making the skin show a brighter state. Yang Hongqiu et al. divided 80 cases of melasma patients into two groups by taking oral tranexamic acid treatment for 5 consecutive months, in which the treatment group was also treated with combined fruit acid treatment for 5 consecutive times once every 1 month [3]. The results of the experiment found that the control group and the treatment group did not have serious adverse reactions in the treatment, and the total effective rate of the treatment group was 87.5%. Su Xian et al. divided 60 cases of female chloasma patients into two groups, the experimental group applied 10% niacinamide twice a day topical application, 30% supramolecular salicylic acid once every 2 weeks, continuous treatment for 16 weeks, the control group applied 10% niacinamide simulant and 30% supramolecular salicylic acid simulant, with the same method of treatment [4]. The experimental results showed that the effective rate of 10% niacinamide combined with 30% supramolecular salicylic acid in the treatment of chloasma in women was 60%, niacinamide and salicylic acid inhibited the activity of melanocytes, inhibited the activity of tyrosinase in melanocytes, lowered the content of melanin in melanocytes, and regulated the morphology and structure of melanocytes, and the effect of the combined application was greater than that of the individual application.

### 2.2. Laser Treatment

Laser or Intense Pulsed Light treatment involves the use of specific wavelengths of laser light to deliver high energy to areas of hyperpigmentation, causing the pigment cells to be destroyed, resulting in the reduction of hyperpigmentation. Laser or intense pulsed light treatment has fewer side effects, but requires attention to skin care before and after treatment. Common laser treatments include picosecond laser treatment, Q-switched laser treatment, and fractional laser treatment. In 2019, Ping Weidong et al. applied the combination of 755 nm picosecond laser instrument's flat light lens and Focus honeycomb lens to treat 36 patients with melasma, and treated them once every 4 weeks, and 6 times for 1 course of treatment. After 6 times of treatment, the color and area of facial pigmentation spots were better improved [5]. The results showed that this method has less adverse reactions, low recurrence rate, high patient satisfaction, and is an effective new treatment program. In the same year, Chen Yan et al. compared the efficacy of Q-switched 1064nm Nd:YAG laser combined with fruit acid peeling with the single use of Q-switched 1064nm Nd:YAG laser or fruit acid peeling for melasma treatment by observing the efficacy of Q-switched 1064nm Nd:YAG laser combined with fruit acid peeling was significantly higher than that of the single use of Q-switched laser or fruit acid peeling, with a treatment rate of 84.6% [6]. Liu Sutaotao et al. used 694 nm fractional laser combined with levitamin C to treat 30 cases of menopausal female patients with melasma, once in 2 weeks, and after 4 weeks of treatment, their total effective rate was 96.67% [7].

### 2.3. Intense Pulsed Light Therapy (IPLT)

The principle of Intense Pulsed Light is selective photothermal action, which converts light energy into heat energy. It is a kind of broad-spectrum light with a nuclear draft of intensity, which is formed after focusing and filtering, which can make the thermal energy reach the target tissues

sufficiently, and is able to destroy and decompose the pigment particles, as well as improve the dilation of the capillaries, so as to achieve the purpose of lightening the pigmentation and improving the quality of the skin [8]. Studies have shown that the use of intense pulsed light treatment alone may produce strong sequelae, and it is generally recommended to be combined with laser treatment [9]. In 2017, Song Hongjuan et al. found that the combination of ruby fractional laser and intense pulsed light treatment had a high degree of safety and efficacy in 102 patients with chloasma, by first giving them Q-switched ruby fractional laser treatment with an energy density of 2.53.5 J/cm<sup>2</sup> and intense pulsed light treatment 2 weeks later [10]. In 2020, Liu Xiaojiao et al. found that the efficacy of intense pulsed light combined with Q-switched 1064 nm Nd:YAG laser in treating melasma was significantly better than that of intense pulsed light alone by comparing 99 people in a group with no adverse effects, and the total effective rate was 90.90% [11].

## 2.4. Cryotherapy

Cryotherapy is the use of liquid nitrogen and other substances to freeze melasma, so that the pigment cells are damaged, thus achieving the effect of reducing hyperpigmentation. Cryotherapy has fewer side effects, but requires attention to skin care before and after treatment [12]. Zhang Steam et al. applied human liquid nitrogen freezing combined with the addition and subtraction of Free and Easy San to treat 39 patients with melasma, and its total effective rate was 78.95% [13].

## 3. Traditional Chinese Medicine External Treatment

Chinese medicine external treatment is a kind of Chinese medicine principle based, through the external application of traditional Chinese medicine, acupuncture, gua sha and other means of direct action on the surface of the human body's therapeutic methods, commonly used in the treatment of skin diseases.

### 3.1. External Application of Chinese Medicine

External application of Chinese medicine is one of the common methods of external treatment in Chinese medicine. In the treatment of chloasma, Chinese medicines can be applied and fumigated. Commonly used Chinese medicines include *Angelica dahurica*, *Platycodon grandiflorus*, *Astragalus membranaceus*, cypress, dihuang and so on. These Chinese medicines can be used externally to act directly on the skin and reduce the phenomena of dullness and pigmentation. The side effects of topical application of Chinese medicines are relatively small, but attention needs to be paid to the selection of appropriate Chinese herbal formulas and the correct method of use [14]. Zhou Shoulun et al. used Yu Rong Anti-Blemish San (*Angelica dahurica*, *Radix Angelicae Sinensis*, *Radix Angelicae Sinensis*, *Radix Angelicae Sinensis*, etc.) to treat 47 cases of chloasma, and the total effective rate was 87.2% [15]. Gao Huiqin et al. used *Angelica sinensis*, *Angelica dahurica*, Bai He, Bai Poria, Bai Fu Zi, and Xin Xin to treat chloasma externally twice a week, and the total effective rate was 87.8% after 3 consecutive courses of treatment (10 times for each course of treatment) [16].

### 3.2. Acupuncture

Acupuncture is another common method of external treatment in TCM. By needling specific acupoints, it stimulates the meridians and regulates qi and blood to achieve the effect of improving the phenomena of dull skin and hyperpigmentation [17]. Acupuncture treatment is divided in detail into simple needling, fire needling, and so on. As far as the use of simple acupuncture is concerned,

Chen Dan et al. treated 40 cases of female chloasma patients with floating needle circumferential stabbing combined with garnished free powder [18]. The results showed that the treatment of chloasma with floating needle peri-acupuncture combined with Jiawei Yiwu San could significantly reduce the patients' plaque area and plaque color scores, and significantly increase the total effective rate of the treatment, which was clinically efficacious, and worth to be promoted for use in the clinic. Wu Panhong et al. treated 60 cases of chloasma patients with blood stasis by using fire needle and shallow stabbing, and gave the patients Shen Gui Anti-Spotting Pills orally and combined with local skin lesions treated with fire needle [19]. The results showed that the effect of fire-acupuncture in the treatment of chloasma with blood stasis is safe and reliable, and can obviously promote the efficacy of oral and external drugs, which can effectively improve the facial lesions and improve the quality of life of the patients, and is worthy of further popularization and application in the clinic.

### 3.3. Gua Sha

Gua Sha is a kind of external treatment in Chinese medicine, by using special tools to scrape some red or purple traces on the surface of the skin to promote blood circulation and metabolism of the skin. In the treatment of chloasma, commonly used gua sha techniques include neck gua sha, shoulder and back gua sha, leg gua sha, etc. Specific methods need to be selected according to the condition and individual differences. Ding Yifan et al. by 90 cases of chloasma patients randomly divided into two groups, the control group and the observation group, the control group of patients to take the conventional treatment, the observation group of patients in the control group based on the implementation of facial Gua Sha treatment [20]. The experimental results show that facial gua sha is the main treatment for chloasma patients, not only can effectively improve the patient's condition score, but also can improve the total effective rate of treatment of patients.

## 4. Combination of Chinese and Western medicine

In addition to individual Chinese medicine or Western medicine external treatment methods, some medical practitioners try to use the combination of Chinese and Western medicine treatment methods, the doctor according to the patient's condition and physical condition, combined with traditional Chinese medicine, Western medicine treatment, laser treatment and other means of comprehensive treatment. Through the combination of Chinese and Western medicine, the advantages of various treatment means can be fully utilized to improve the therapeutic effect and reduce the adverse reactions.

For example, laser treatment is supplemented with external application of Chinese medicine. Liu Tiejun et al. randomly divided 98 cases of chloasma patients into 2 groups to carry out a controlled study. Fractional laser treatment was given to both groups, and the combined group was treated with the external application of cumexoside cream. The total effective rate of the combined group was 87.76%, which was higher than that of the laser group (69.39%) [21]. The experimental results showed that the fractional laser combined with cumosin cream ointment treatment of chloasma is effective, safe and reliable, and is worth the clinical application. Supplemented with external application of traditional Chinese medicine during ultrasonic treatment. Jing Xi Kuan et al. applied ultrasound combined with homemade expectorant cream (decoction of Angelica sinensis, Chai Hu, Rhizoma Ligustici Chuanxiong, Safflower, Poria cocos, Angelica dahurica, and Bai He and other medicines were concentrated, and added into the matrix to make a cream made of oil-in-water) to treat chloasma in 40 cases, and the efficacy of treatment was obvious with the total effective rate of 92.5% when compared with that of the group of using expectorant cream alone after 2 months of treatment [22]. The experimental results showed that the homemade expectorant cream combined

with ultrasonic wave introduction was highly effective in treating melasma without obvious side effects.

## 5. Conclusion

The etiology and mechanism of chloasma is complex, and the problems of high recurrence rate and uneven coloration often occur after treatment, which often affects the patient's mood and daily life. At present, western medical treatment includes chemical expectoration, laser treatment, intense pulse light treatment and so on. Chinese medicine treatments include topical application of traditional Chinese medicine, acupuncture, gua sha and so on. The combination of Chinese and Western medicine usually uses Western medicine for treatment (e.g. laser treatment, ultrasound treatment, etc.), supplemented by Chinese medicine for external application, which has better effect compared with single means. This article mainly summarizes the above related aspects of chloasma treatment in recent years. Various external treatments for chloasma have their own advantages and disadvantages, patients should choose the suitable treatment method for themselves and carry out the treatment under the guidance of professional doctors. Meanwhile, daily protection is also very important, such as avoiding prolonged exposure to sunlight and using suitable sunscreen.

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