



Comparative clinical study of the effectiveness of IPL and AHA in underarm whitening treatment

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Abstract

The objective of this research was to evaluate the whitening efficiency of IPL and AHA for underarm whitening treatment on 20 volunteers aged between 24 and 34 years with biweekly treatment for five times. The skin color was evaluated by Fitzpatrick skin type paper and photography. The results indicated that both underarm whitening treatments, AHA and IPL, enhanced skin color and smoothness. AHA treatment enhanced skin color 65% and 35% for one level and two levels, respectively. Meanwhile, IPL treatment improved skin color 30% for one level and 70% for two levels. The improvement of skin smoothness was 5% and 45% for AHA and IPL, respectively. After the treatment for one month, AHA showed skin color recover 30% for one level and 30% decreased in skin smoothness, whereas IPL treatment showed no change in color and smoothness. Therefore, the levels of whiteness and smoothness of IPL were higher than AHA 85% and 30%, respectively. For evaluation on irritation of underarm, the symptoms were found from treatment including redness, drying, flaking, burning and itching. IPL treatment causes side effects less than AHA treatment. Moreover, the evaluation of satisfaction after treatment showed that the participants in this project are pleased with IPL 15% more than AHA.

Keywords: white underarm, smoothness, skin peeling, alpha hydroxy acid, intense pulsed light

Introduction

The skin rejuvenation methods are preventive techniques to keep skin healthy and youthful looking by helping to reverse the appearance of sun damage and aging. The treatment causes the surface of the skin to exfoliate which reduces irregular pigmentation and improve skin smoothness appearance (Kim, 2008). Skin can rejuvenated to new cells by using chemical peeling and rejuvenation techniques. Chemical peeling can result in epidermolysis, protein precipitation, or tissue denaturation when applied to the skin (Hassan & Benedetto, 2013). α -Hydroxy acid (AHA) is a group of organic acids which have recently become popular chemical peeling agent in the treatment of several skin conditions (Rubin, 1994). AHA has been reported to produce significant reversal of epidermal and dermal markers of photoaging (Ditre *et al.*, 1996; Van Scott *et al.*, 1996). AHA promotes cell growth and retard cell differentiation, help faster remove aging skin cells, fade away dullness and black spot and also stimulate the formation of collagen fibers which giving rise to a younger-looking skin (Wang, 1999). Nevertheless, the chemical peels must concern in many variables such as agent concentration, contact duration, application method, and patient's skin type (Briden, 2004). Nowadays, the photorejuvenation techniques are an alternative rejuvenation method which high efficiency, especially intense pulsed light (IPL) treatment (Kim, 2008). IPL systems are high-intensity light sources which emit polychromatic light. These flashlamps work with noncoherent light in a broad wavelength spectrum of 515 - 1,200 nm (Raulin *et al.*,

2003). Previous studies showed that IPL improved fine wrinkle, irregular pigmentation, skin texture, pore size and telangiectasia (Bitter, 2000; Negishi *et al.*, 2001). However, these two methods are different advantage and disadvantage in the treatments. The purpose of this study was to compare the performance of underarm whitening treatment between AHA and IPL. The whiteness, smoothness, and side effects were evaluated by Fitzpatrick skin type paper and photography. Moreover, the satisfaction of volunteer was evaluated after treatment.

Methodology

Twenty healthy female subjects, aged 20 - 40 years (average = 29 years) were recruited. The skin phototypes of subjects were classified according to Fitzpatrick skin type and divided into 3 skin types including III (3 subjects), IV (9 subjects), and VI (8 subjects). This research was approved by the ethics committee of The Declaration of Helsinki of Mae Fah Luang University. Before the treatment performance, all patients agree to sign informed consent paperwork and revealed medical history of them. A comparison of IPL and AHA treatments was applied on underarms with biweekly treatment for five times. One underarm side was treated with 40% AHA (Sigma-Aldrich, USA). In the other underarm side was treated with IPL (Forma Lighting, Israel) which used a wavelength of 530 nm. After treatment, skin color was measured with Fitzpatrick skin type paper and photography. The smoothness of underarms was evaluated with naked eyes. The side effects were assessed by redness, drying, flaking, burning and itching after immediately each treatment time. In addition, the satisfaction of volunteer was evaluated after complete treatment.

Results

Skin color level of underarms which were treated with AHA and IPL treatments

The change of skin color with AHA and IPL treatments was showed in Figure 1. The finding indicated that both AHA and IPL enhanced skin color after 2nd treatment. Skin color of AHA treatment was lightened for 1 level of 20, 75, 80, and 65% at 2nd, 3rd, 4th, and 5th treatment, respectively. It was lightened for 2 levels of 15 and 35% at 4th and 5th treatment, respectively. While, skin color of IPL treatment was lightened for 1 level of 30, 90, 75 and 30% at 2nd, 3rd, 4th, and 5th treatment, respectively. It also was lightened 2 levels of 25, and 70% at 4th, 5th treatment, respectively. Moreover, after five treatments have been completed and left for one month, it was found that the skin color of underarm of 6 patients which treated by AHA were darken for 1 level (30%). Meanwhile, the skin color of underarm which treated by IPL showed no change in skin color. Therefore, the IPL was higher level of whiteness than AHA.

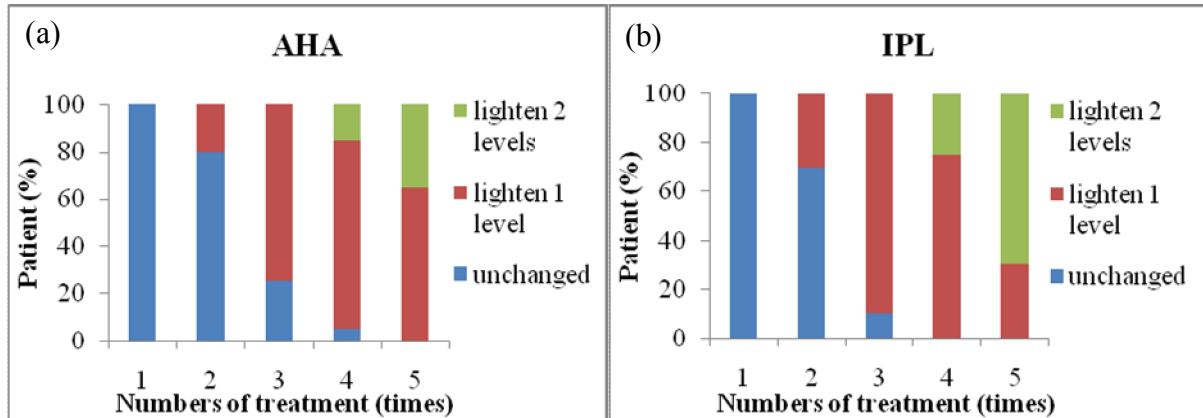


Figure 1: Underarm lighten level with AHA (a) and IPL (b) treatments

Smooth level of underarms which were treated with AHA and IPL treatments

The increasing of smoothness from the pre-treatment was defined into 3 levels comprise of wrinkle reducing (1 level), some wrinkle disappearing (2 levels), and pores underarm tightening (3 levels). The smoothness change of underarms skin with AHA and IPL treatment was showed in Figure2. The findings indicated that both AHA and IPL increased smoothness after 2nd treatment. AHA treatment smoothed for 1 level of 30, 100 and 80% at 2nd, 3rd and 4th treatment, respectively. AHA also smoothed 20 and 95% at 4th and 5th treatment for 2 levels and 5% at 5th treatment for 3 levels. While, IPL treatment smoothed for 1 level of 70, 80 and 20% at 2nd, 3rd and 4th treatment, respectively. IPL also smoothed 20, 80 and 55% at 3rd, 4th, and 5th treatment for 2 levels and 45% at 5th treatment for 3 levels. Moreover, after five treatments have been completed and left for one month, it was found that the smoothness of underarm skin of 6 patients which treated by AHA was decreased for 1 level (30%). Meanwhile, the smoothness of underarm skin which treated by IPL showed no change in skin smoothness. Therefore, the IPL was higher level of smoothness than AHA.

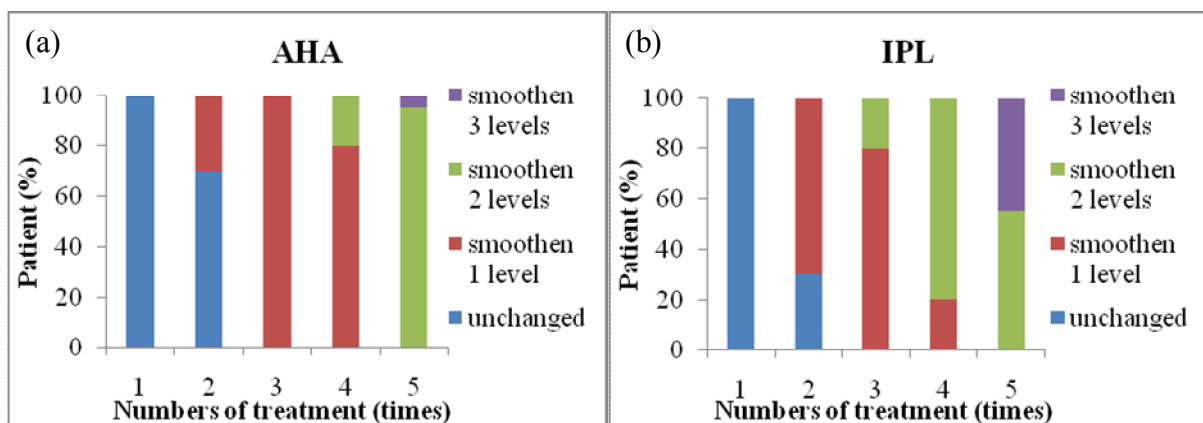


Figure 2: Underarm smoothing level with AHA (a) and IPL (b) treatments

Side effects of AHA and IPL treatments

The results of side effects on underarm skin were divided into 5 effects including redness skin, dry skin, flaking skin, burning surface, and itchy skin (Figure 3). For AHA treatment, redness skin was found immediately after treatment about 20 minutes in 20 participants (100%) of AHA treatment. Dry skin was found after treatment for approximately 4-5 days, which showed symptoms about 3 days of 20, 65, and 90% at 3rd, 4th, and 5th

treatment, respectively. Flaking skin was found symptoms about 3 days of 10 and 25% at 4th and 5th treatment, respectively. Burning surface was found in the treatment immediately but usually the symptoms were not serious and steadily decreasing. It was found 100, 100, 90, 80, and 65% at 1st, 2nd, 3rd, 4th, and 5th treatment, respectively. Itching skin was found approximately one day after treatment and often has symptoms for 1 night after treatment. It was found 100, 95, 55, 5, and 0% at 1st, 2nd, 3rd, 4th, and 5th treatment, respectively. While, IPL treatment was found redness skin that was found 95, 95, 95, 90, and 95% at 1st, 2nd, 3rd, 4th, and 5th treatment, respectively. Dry skin was found 40 and 50% at 4th and 5th treatment, respectively. Itching skin was found 10 and 10% at 4th and 5th treatment, respectively. Moreover, there were no side effects about skin peeling and burning skin in IPL treatment.

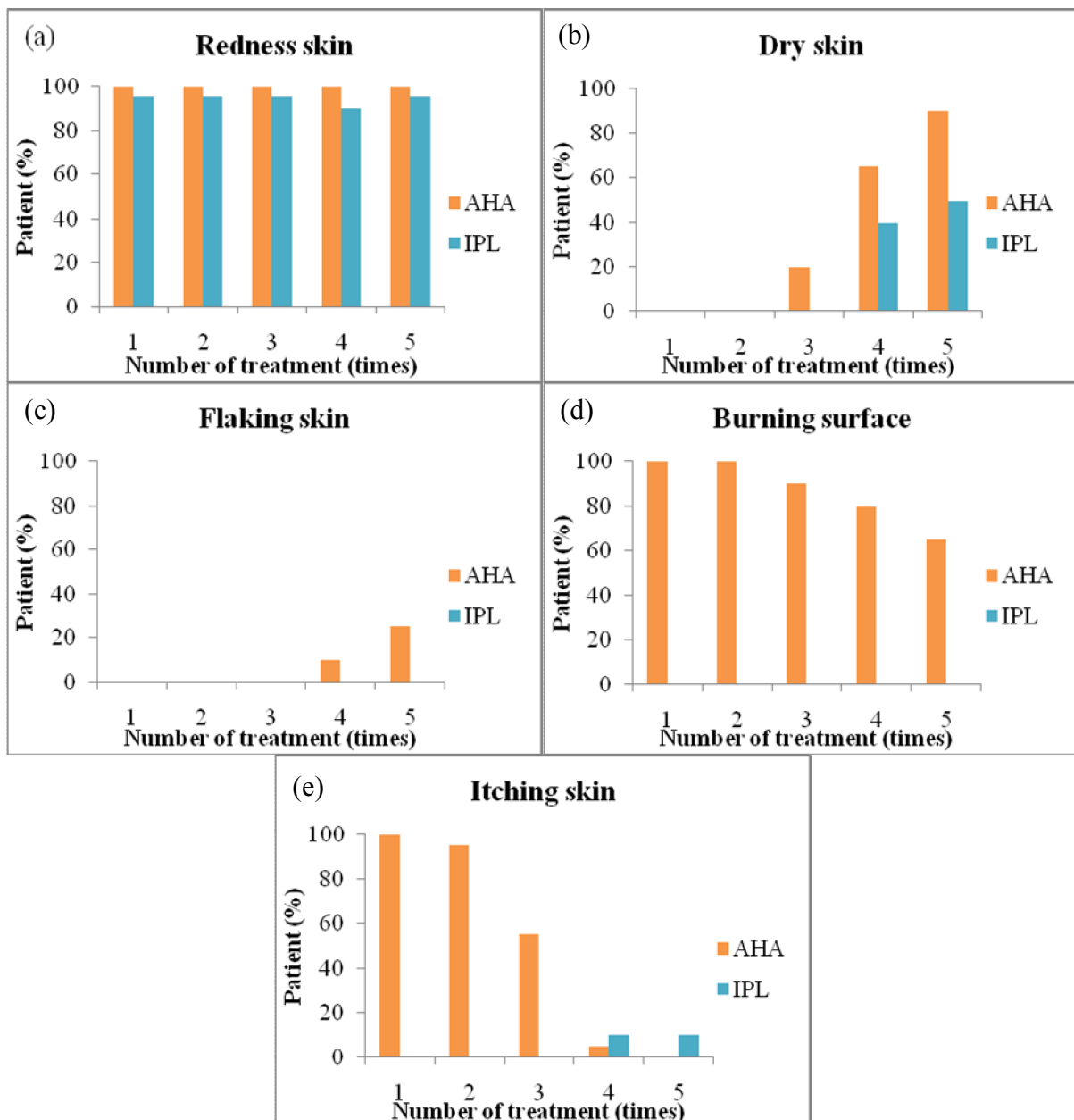


Figure 3: Side effects on underarm skin of AHA and IPL treatments were divided into 5 effects including (a) redness skin, (b) dry skin, (c) flaking skin, (d) burning surface, and (e) itching skin

The evaluation of the participant’s satisfaction

The evaluation of the participant's satisfaction was showed in Figure 4. The result of AHA treatment was very satisfied at 15%, satisfied at 70%, and not satisfied at 15%. While, satisfaction of IPL treatment was very satisfied at 65%, and satisfied at 35%. From the evaluation showed that the participants in project were more satisfied with IPL treatment than AHA treatment. Moreover, IPL treatment have more effective in terms of lighter skin color, increased smooth armpit and less irritating than AHA treatment. However, there had 3 participants who was not satisfied with AHA treatment because they found the underarm darker and smoothness return when the time pass. The participants are expected to maintain white underarm after AHA treatment to long-lasting performance.

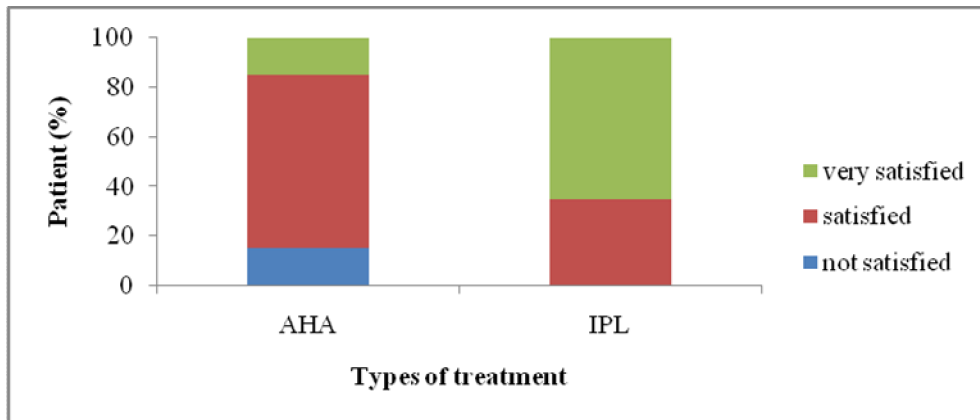


Figure 4: Satisfaction levels of AHA and IPL treatment

Discussion

The efficiency of AHA and IPL treatments in underarms was evaluated whiteness and smoothness by using Fitzpatrick skin type paper and photography. The results of this study showed that both AHA and IPL could rejuvenate underarms skin and enhanced whiteness and smoothness. However, the effects of AHA and IPL were difference due to AHA is chemical peeling agent, while, IPL is photorejuvenation. IPL treatment was higher effective than AHA treatment about 85% and 30% for whiteness and smoothness, respectively. IPL is shining the light through the skin down to the dermis. The light is converted to be heat emerges and will affect to the change of tissue by removing the overall pigment in the epidermis and reducing the dark spots. Moreover, there was found that AHA was affect in people who have a lot of pigment melanin or dark skin. This result may be occurs because AHA treatment can inhibit the enzyme tyrosinase (Phillips, 1994).

At 1 month period after complete treatment, the whiteness and smoothness of underarm skin werestill as complete treatment in IPL treatment but was decreased in AHA treatment, especially people who have deep wrinkles or armpits before treatment. These results were possible that AHA treatment affects the cell surface or stratum corneum in deep areas or peel off slowly to prepare the skin more flexible. It is make new skin cells divide and push up, reduce small wrinkles and aging after various times of treatment(Sarisson, 1994). While, IPL treatment will be released light energy and heat to the dermis which stimulate a new collagen and tighten the elastin fibers under the skin layer. So, the skin firm and wrinkles surface layer fade away (Heymann,2007). However, the skin recover in each part of each person's body were difference. So, if there spend more times, the treatment may make the skin lighter than ever.

The study found that side effects of AHA treatment were more serious than IPL treatment because AHA had high concentration (40%) of acid with low pH (pH 2) (Usuki, 2003). AHA was possible to peel down in depth skin. The destruction of outermost layer of the skin cells which is responsible for protect the lower layers of skin cells, making more irritation. While, IPL treatment is a non-ablative laser treatment technology which can produce red skin because of the heat energy from the beam and this symptom will disappear in about 20 minutes (Perricone, 1996). The heat energy can produce dry skin, lose moisture, and itching. However, it has limitations in dark skin people because they absorb light very well. If the power level is too high, it can cause skin burns easily and dark skin can come back. So, they have to treat constantly and select anti-sweat product or perfume that does not cause allergies or irritation (Heymann, 2007).

Conclusion

This clinical research is an experimental study for the purpose of assessing efficiencies of whitening underarm with AHA and IPL treatments. This research also aims to examine efficacies, side effects and satisfactions of both methods. The results of both treatments were studied on the same person for reduce bias in this research. At the present, there are several methods of skin color assessment. In this research, the skin color, smoothness and side effects were evaluated by Fitzpatrick skin type paper and photography before and after treatments. The result of the studies clearly demonstrated that IPL treatment reveals higher efficiency than AHA in terms of whitening, smoothening, and less irritation. Moreover, the project participants were pleased with IPL rather than AHA.

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