Photopneumatic Therapy for the Treatment of Keratosis Pilaris

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ABSTRACT

Background: Current treatment options for keratosis pilaris (KP) are limited and are often found to be unsatisfactory to patients.
Objective: Pilot study to determine if photopneumatic therapy (PPx) can improve the erythema and skin texture in KP.
Methods: Ten patients with KP were treated with one session of PPx on the upper arm and then evaluated one month later for treatment efficacy.
Results: Average investigator-assessed improvement was 27% in erythema and 56% in skin texture roughness. Average patient self-reported improvement was 52% in erythema and 53% in skin texture. The mean satisfaction score was 6.3 on a scale of 1 to 10 (median 7.5) and 8 out of 10 participants reported they would choose to receive PPx for their KP again in the future.
Limitations: Small number of patients, short follow-up period, and lack of blinding of the examiner and the patients making recall bias possible.
Conclusions: One treatment of PPx improved both the erythema and redness associated with KP over at least a one month period.

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INTRODUCTION

Keratosis pilaris (KP) is a common disorder featuring grouped keratotic follicular papules with varying degrees of perifollicular erythema. Lesions are characteristically located on the extensor surfaces of the upper arms, thighs and buttocks, but may also appear on the lateral cheeks or trunk.[1-3] Patients often complain of persistently rough-textured skin in these areas. It is a benign autosomal dominant disorder with variable penetrance that is generally asymptomatic but can occasionally be pruritic.[3,4] Individuals can also suffer from psychological distress associated with the perceived poor cosmetic appearance. KP can spontaneously improve with age but has an estimated prevalence of 50% during adolescence, with females being disproportionally affected.[1] The onset or severity of KP may be related to hormonal changes during puberty or pregnancy.[5] Typical treatment options include emollients and other dry skin care habits such as gentle soap-less cleansers, keratolytics and mild topical steroids. Topical retinoids and calcineurin inhibitors have also been tried. However, many patients report disappointing results with these treatment options. Recently, there have been a few reports involving the use of lasers including Q-switched 1064-nm Nd:YAG, 595-nm pulsed dye laser, long-pulsed 755-nm alexandrite laser and microdermabrasion.[6-10] To our knowledge, there have been no reports on the use of photopneumatic therapy (PPx) for the treatment of KP. This treatment option combines light-based therapy with a pneumatic component to address both the follicular plugging and inflammation seen in KP. We present 10 patients with KP on the upper arms treated with one session of PPx and then evaluated one month later for treatment efficacy.

METHODS

Ten patients who presented to the general medical or pediatric dermatology clinic with KP were invited to participate in the study. Institutional review board approval from Washington University was obtained for this study and informed consent was obtained from all participants for PPx treatment. None of the patients were currently using any form of treatment for their KP and they were instructed not to use any other treatments throughout the duration of the study. One half of each patient's upper arm was treated using a portable photopneumatic device (Isolaz, Aesthera Co., Pleasanton, CA, USA) with the following settings: vacuum 3, light 5 with 2 passes to the treatment area. No topical anesthetics or cooling gels were needed. All participants were given a baseline evaluation of the redness and skin texture roughness of their KP by the study investigator (SJB) on a scale of 1 to 3 (1 = mild, 2 = moderate and 3 = severe). Clinical improvement was evaluated one month after the treatment by the same investigator and the participants filled out a post-treatment questionnaire rating the improvement in their redness and roughness on a scale of 0% to 100%. In addition, the participants rated their overall satisfaction with the treatment on a scale of 1 to 10 (1= least satisfied, 10 = most satisfied) and were questioned on the comparison of the PPx with any previous treatments they had tried for KP. Any adverse effects of the treatment were documented at the follow-up visit including any erythema, purpura, hypo- or hyperpigmentation, blistering or scarring. This was an investigator-initiated study. No part of the study was overseen or funded by the device manufacturer.

RESULTS

The average age of the participants was 29 years (range 13-45 years), with one male and nine females. The patients had Fitzpatrick skin types I-III. The investigator's average improvement in erythema was 27% and in skin texture roughness was 56%.

FIGURE 1. Left arm at baseline.

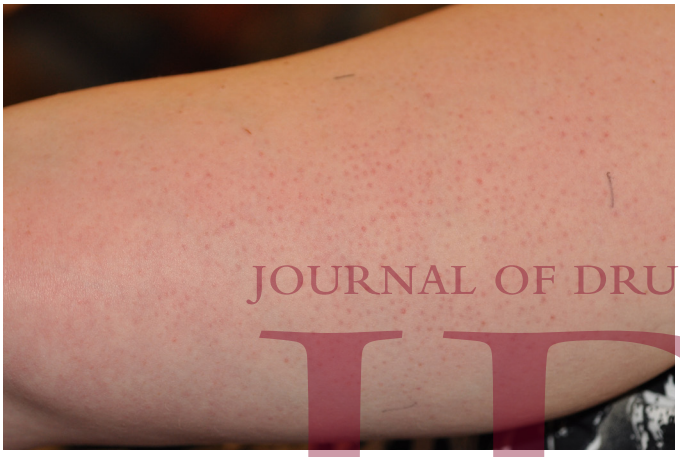


FIGURE 2. Decreased erythema and skin texture roughness at one month follow-up.

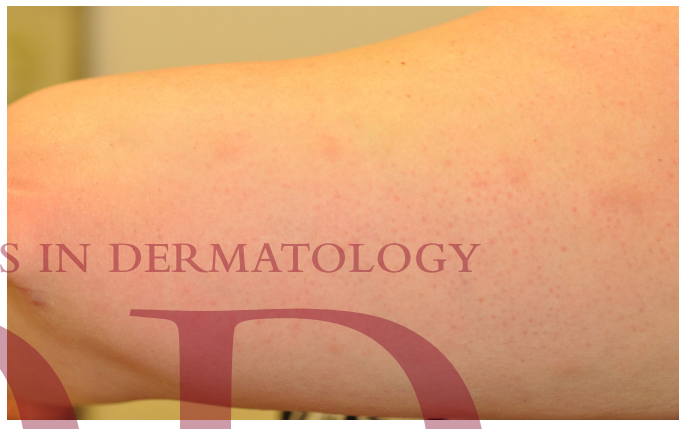
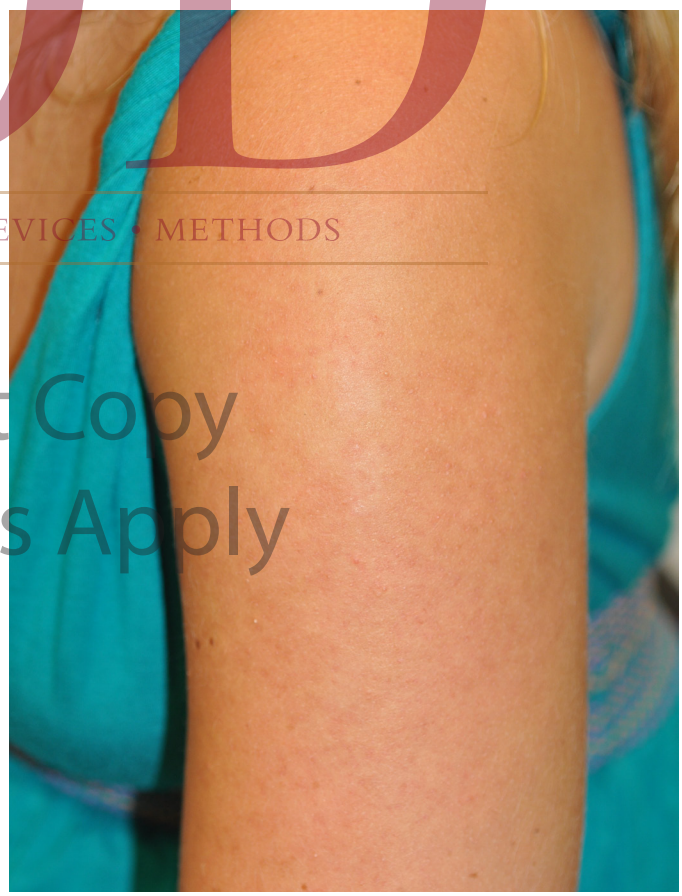


FIGURE 3. Subtle hypopigmentation on mid upper arm at one month follow-up.



Participant's average self-reported improvement in erythema was 52% and in skin texture was 53% (Figures 1 and 2). The mean satisfaction score was 6.3 on a scale of 1 to 10 (median 7.5) and 8 out of 10 participants reported they would choose to receive PPx for their KP again in the future. Two patients reported adverse effects. One reported transient hypopigmentation that was resolving and was barely visible at the one month follow-up appointment (Figure 3) and one reported mild purpura in a portion of the treated area that she stated lasted for 2 days after the treatment and was resolved at the one month follow-up. Of the five participants who had previously tried topical emollients or keratolytics for their KP, four stated they thought the PPx had greater efficacy than the topical treatments.

DISCUSSION

PPx is currently approved by the Food and Drug Administration for the treatment of acne. It is unique among light-based treatments because it combines a pneumatic handpiece that elevates and stretches the skin while concurrently delivering light from 400-1,200 nm, with a peak absorption at 440-550 nm.[11] Its efficacy for acne is believed to be due to the destruction of *P. acnes* by blue light, reducing sebum secretion and extruding keratin and sebum out of plugged follicles.[11-14] We hypothesized that PPx might also be beneficial in the treatment of keratosis pilaris when considering the histopathological features. In KP, there is hyperkeratosis, hypogranulosis and follicular plugging in the epidermis with a mild perivascular lymphohistiocytic infiltrate in the upper dermis and perifollicular regions.[3] The combination of the pneumatic component with the light therapy in PPx would help to alleviate follicular plugging and inflammation seen in KP.

Our results support that skin texture roughness was improved to a greater extent by PPx than the erythema associated with KP by clinical evaluation, but patient self-reports showed an average improvement of slightly greater than 50% in both erythema and skin roughness with just one treatment of PPx. The mean satisfaction score was 6.3 on a scale of 1 to 10 and a high percentage (80%) of participants stated they would choose this treatment option again in the future. There were no major adverse events in this study such as blistering, scarring or permanent dyspigmentation. One patient had transient hypopigmentation and one had mild purpura. PPx was well

tolerated by the participants and did not require any topical anesthetics or cooling gels. In conclusion, our data suggest that one treatment of PPx improved both the erythema and skin texture roughness associated with KP over at least a one month period. Limitations of our study include the small number of patients, short follow-up period, and lack of blinding of the examiner and the patients making recall bias possible. Longer-term studies would be needed to assess the duration of the effect achieved with PPx and determine the effect of multiple treatments on the efficacy of PPx.

DISCLOSURE

All costs related to the study were supplied by the Division of Dermatology at Washington University School of Medicine. The authors have no conflict of interest to declare.

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