New approach for low intensity light therapy of acne

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Abstract

Background and Objectives: Blue light in the spectral range of 400-500 nm has maximal therapeutic effect for acne. This clinical study determines the efficiency and safety of therapeutic blue shirts that deliver a significant level of blue light to the skin surface in the specific wavelength range that has a therapeutic effect for acne. The specific matrix of the material is treated with a novel fluorescent blue pigment which transmits and amplifies the therapeutic blue light. The material also offers skin protection from UV with a UPF of 45.

Methods: Patients were instructed to wear the therapeutic blue shirt over a period of 60 days a minimum of 2 hours a week. 12 treatment sites were evaluated during the study. Length of exposure to sunlight in each case exceeded two hours per week. Acne counts were blindly evaluated by the independent investigator before the treatments and at the end of the treatments. Before and after photographs were taken for use in evaluations.

Results: Average decreases in body acne counts from baseline were 65%. Improvements of body acne from baseline were noted where most lesions demonstrate a marked reduction in inflammation at the end of the 60 day treatment period. No adverse effects were observed or reported by the patients. Correlation between exposure time and treatment efficacy was noted.

Conclusions: The fluorescent therapeutic material offers effective therapy against body acne when used properly and consistently. Longer therapy duration is recommended to maximize the efficacy and efficiency of the shirt in treating moderate body acne.

Introduction

Acne is a dermatological problem effecting 70% of adolescences and a significant part of the adult population. It is well-known that sunlight is beneficial for skin affected with acne but harmful UV radiation makes this treatment risky with long sun exposure.

Recently, low intensity light therapy has become popular as a professional treatment for a variety of dermatological conditions including acne. Studies [1,2] report promising results for use of filtered light from broad spectrum source for the treatment of acne vulgaris. Blue light in the range of 405nm-420nm was shown as an effective and safe solution for mild and moderate acne. Papageorgiou, et al. [3] demonstrated significant acne improvement with irradiation using blue light and superior results with a combination of blue and red light.

Significant advancement to this type of treatment occurred with the development of LED (Light Emitting Diode) technology. Users of blue LED sources report improvement of inflammatory acne after 8 sessions for most patients.

Blue light therapy combines absolute safety with significant treatment benefits for acne. The disadvantages of these treatment methods in the clinical setting is the relatively high number of treatments required and the significant treatment time needed.

Methods and materials

In the current study, we used fluorescent therapeutic material developed by SunSoul Inc., Canada. The distinctive material converts the sun's broad spectrum to the specific spectrum which provides maximum benefits for acne treatment. The unique matrix of the fabric is dyed with a fluorescent blue pigment which amplifies transmission in the spectral range of 400-500nm and in the near infrared spectrum.

Transmission spectrum of the fluorescent therapeutic material (FTM) is shown in figure 1.

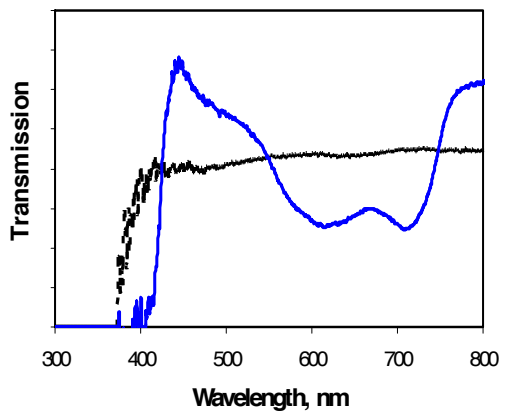

Figure 1. Black curve - light transmission by non-dyed material, Blue curve light transmission by FTM

The FTM almost doubles the delivery of light in the range 400-450nm. Fluorescent dye applied to the polymer matrix absorbs the UV band of the sun's radiation and converts it to blue light thereby amplifying its intensity on the skin's surface. The distinctive dye composition also increases light transmission in the near infrared spectrum above 700nm.

Light transmission in the UV range of the spectrum is negligible. Figure 2 shows a magnified image of the material and demonstrates the density of fibers at about 99%. Strong absorption of the UV light by the polymer matrix and by the applied fluorescent dye provides UV protection factor (UPF) of 45.

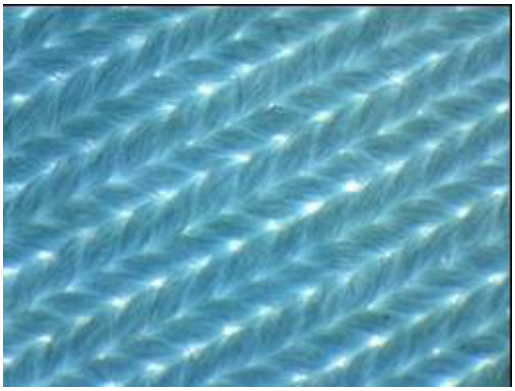

Figure 2. Magnified image of FTM.

This selective spectrum delivered to the skin of the patient is optimal for the treatment of acne. The FTM was used for long sleeve T-shirts to convert non-specific sun radiation to the therapeutic bands of light and maximize its delivery to the skin of patients.

Male and female patients of various ages and skin types were included in the study. Patients were instructed to wear the shirt at least 2 hours a week outdoors during the day from 10AM to 4PM. Patients were directed to use protective sun screen with SPF of 30 or higher on areas not covered with the FTM. The study was conducted in Auckland, New Zealand and Adelaide, Australia during the months of March to April, when the sun activity is not maximal for those regions. The reduced sun activity months were chosen to avoid seasonal effect on study results.

During the study, only body acne was treated. Facial acne was excluded due to the difficulty in controlling light exposure during normal day activity. When not wearing the FTM shirts, patients were instructed not to be outside without dense clothing protecting treatment areas from sun exposure.

Patients were photographed both prior and post treatment. Acne counts and acne grade evaluations were performed blindly by an independent observer.

Results and discussion

There were a total number of 12 treatment sites in the age range from 14 to 49 years old. Each patient represents two possible treatment sites, back and chest.

The average improvement in acne counts following therapy with FTM was 65% overall, with non-significant variation in the efficacy between adolescent acne and adult patients (Fig. 3).

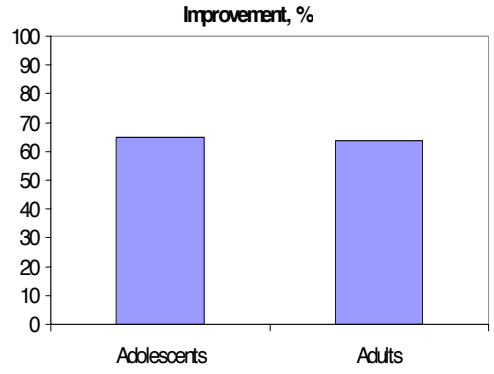

Figure 3. Average improvements in acne counts

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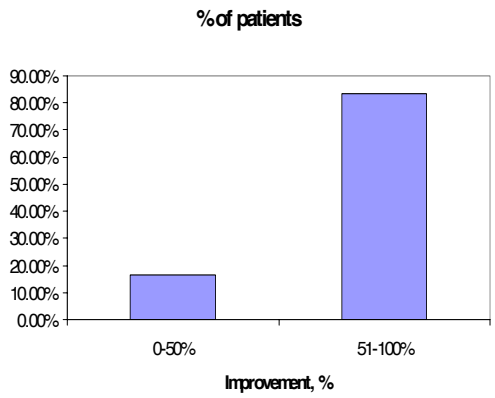

Figure 4. Patient distribution by improvement rate.

Figure 4 shows that about 80% of patients had improvement above 50%.

Figure 5. 14 y.o. male patient before (top) and at the end of the treatment (bottom).

Figures 5 and 6 show patients with improvement of body acne at the end of the 2 month treatment period.

In addition to the decrease in acne counts, a marked reduction of acne inflammation was observed.

Self-assessment of treatment results by the patients affirmed the professional observation. Most of the patients noted correlation between their results and treatment time. The more time the patients spent in the sun wearing the FTM shirts, the better results were.

Most of the patients observed notable results after 4 weeks of treatment.

No suntans or sunburns were observed on the areas protected by the FTM shirts, indicating high protection from UV radiation.

Figure 6. 49 y.o. female patient before (top) and at the end of the treatment (bottom).

Conclusion

FTM is a promising modality for the treatment of acne affecting all ages and potentially for other issues such as skin wrinkling and inflammatory skin conditions. The marriage of light therapy with high UV protection provides the user an opportunity for a better quality of life as the combination offers health benefits without changing normal life-style. This treatment is safe and acceptable for anyone and does not require special time commitment by the patients with active life-styles who spend some time outdoors. The preliminary study shows notable improvement of acne for the majority of users and high patient satisfaction with treatment results. Further studies are required to determine any limitations of this treatment method. Optimal dose of sun radiation should be determined to optimize the treatment schedule.

References

1. Effective treatment of acne vulgaris by high intensity narrow band light 405-420nm. Elman M, Slatkine M, Harth Y. Journal of Cutaneous Laser Surgery. July 2003.
2. The Treatment of Mild to Moderate Acne Vulgaris with a New 420 nm Wavelength Light Based System Michael H Gold,M.D American Academy of Dermatology Annual Meeting. San Francisco, March 2003.
3. Phototherapy with Blue (415nm) and red (660nm) in the treatment of acne vulgaris. Papageorgiou, P.; Katsambas, A; Chu, A. British J. of dermatology 2000, 142: 973-978.
4. LED science and system design matures quickly, Edition of Michael Moreti, Aesthetic Buyer Guide, Sep/Oct 2004