Laser and other light therapies for the treatment of acne vulgaris: systematic review

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CRD summary
The authors concluded that in the short term some forms of light therapy were beneficial for treating acne. However, most of the included studies were small and of variable quality, and treatments varied greatly between the studies. Further, the review process may be vulnerable for errors and bias. The authors’ conclusions must be treated with caution.

Authors’ objectives
To assess the effectiveness of laser and other light treatments for treating acne vulgaris.

Searching
MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, PsycINFO, LILACS, Science Citation Index and Dissertation Abstracts International were searched up to July 2008. Proceedings from dermatology conferences, internet search engines such as Google scholar and Copernicus were searched, experts in the field and laser manufactures were contacted for unpublished studies. Reference lists of identified articles and their citations were checked for additional studies. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) or controlled split-face or other body part trials that evaluated the effectiveness of light therapy alone or in combination with other treatments for treating acne vulgaris were included. Primary outcomes of interest were change in acne lesion count or change in a validated acne scoring system. Adverse outcomes were examined.

Most trials included patients with mild to moderate acne. The percentage of female patients ranged from 10% to 100% (where reported). Some studies included patients from different ethnic groups. Mean age ranged from 18 to 34.3 years (where reported). Treatment comparisons included: light therapy versus placebo; comparison of different wavelengths; light therapy with microdermabrasion versus light therapy alone; photodynamic therapy versus light therapy alone or placebo; and comparison of photodynamic therapy using different creams or light sources for activation. In most trials follow-up ranged from four weeks to 12 months.

The authors did not state how many reviewers performed the study selection.

Assessment of study quality
Study quality was assessed based on method of randomisation, baseline comparability of groups, patient inclusion and exclusion criteria, sample size calculation, allocation concealment, blinding of assessors and participants, intention-to-treat analysis and completeness of follow-up.

The authors did not state how many reviewers performed validity assessment.

Data extraction
The percentage change in lesion count was extracted in order to calculate mean differences and associated 95% confidence intervals (CI).

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
The weighted mean differences (WMD) of percentage change in lesion counts were combined in fixed-effect meta-analyses on an intention-to-treat basis. Heterogeneity was assessed using Cochrane’s $X^2$ test and $I^2$ statistic. Where
pooling was not appropriate, a narrative synthesis was presented.

Results of the review
Twenty-five trials (the authors reported the number of patients to be 694, but this could not be calculated from the tables) were included. Four trials were of variable quality and included a small number of patients (sample size ranged from eight to 46). Allocation concealment and method of randomisation was unclear in most studies.

Light therapy compared with placebo (10 RCTs, n=322): Moderate to large improvements were reported by trials that used blue lights (405nm to 420nm; two trials) and blue-red lights (415nm plus 600nm laser; one trial). Green (532nm pulsed laser; two trials) and yellow lights (585nm pulsed laser; two trials) showed either small to moderate or no improvements. A 1,320nm neodymium:yttrium-aluminium-garnet laser showed a small transient improvement in comedones, but not in inflammatory acne. Infrared radiation therapy (1,450nm diode laser) reduced the mean lesion count compared to control, with reductions in inflammatory lesions after a third treatment of 75.1% for the lower intensity side and 70.6% for the higher intensity side, maintained at 12 months. There were no significant differences between different light intensities.

Light therapy versus conventional topical treatments (three trials, n=119): Blue-red light was found to be effective compared to 5% benzoyl peroxide (p=0.006, one trial). No statistically significant improvements were found in trials that compared blue light to 1% clindamycin (one trial) or intense pulsed light with a 530nm to 575nm filter to benzoyl peroxide (one trial).

In the short term, blue-red light was more effective compared to blue light alone, but was no longer effective at 12 weeks (one trial). Both light therapy alone and light therapy with microdermabrasion significantly reduced inflammatory lesions over 12 weeks, but there were significant differences between these treatments (one trial).

Photodynamic therapy showed a statistically significant reduction in mean percentage inflammatory lesion count at four weeks (WMD 13.7%, 95% CI 11.4% to 15.9%; three trials) and 12 weeks (WMD 20.8%, 95% CI 15.6% to 26%) post treatment. Trials that compared photodynamic therapy using different creams (one trial) or that compared photodynamic therapy using different light sources for activation (one trial) showed no statistically significant differences. Two trials (n=44) that compared photodynamic therapy with placebo/untreated patients showed a significant reduction of inflammatory lesions in the photodynamic therapy group.

Side effects were reported in the review. Some patients discontinued photodynamic therapy due to unacceptable side effects.

Authors’ conclusions
There were limited or no beneficial effects of light therapy alone for treating acne. Light therapies with blue light, blue-red light and infrared radiation sources were more likely to show a benefit than yellow, red or green light sources. Blue-red light appeared to be more effective than benzoyl peroxide in the short term.

CRD commentary
This review focused on a clear research question. Inclusion criteria were well defined for population, study designs and outcomes, but broad for eligible interventions and comparators. The literature search appeared adequate with several sources searched and attempts made to identify unpublished studies, which minimised risk of publication bias. Overall, details on the review process were poorly reported and it was difficult to assess whether appropriate steps were taken to minimise errors and bias during the process. Given the high level of variability between treatment schedules, it was appropriate to combine the studies in a narrative synthesis. However, pooling of photodynamic therapy studies may not have been appropriate as the confidence intervals were very wide; therefore, the results may not be robust. The authors’ conclusions appeared to reflect the data presented. However, most studies included in the review were small, of variable quality and evaluated treatments varied greatly between studies. Further, this review may be vulnerable for errors and bias during the process. The conclusions must be treated with caution.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.
Research: Further trials that compared light therapy to other conventional treatments and used a greater number of patients were required to determine the effectiveness of light therapy for treating acne. The results should be reported so that meta-analysis was possible.

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