

**Cochrane** Database of Systematic Reviews

# **Light therapies for acne (Review)**

Barbaric J, Abbott R, Posadzki P, Car M, Gunn LH, Layton AM, Majeed A, Ca	Barbaric J. Abbott	k, Posadzki F	ζ Car M.	, Gunn LA,	Layton AM	, majeed A	, car
---	--------------------	---------------	----------	------------	-----------	------------	-------

Barbaric J, Abbott R, Posadzki P, Car M, Gunn LH, Layton AM, Majeed A, Car J. Light therapies for acne.

 ${\it Cochrane \ Database \ of \ Systematic \ Reviews \ 2016, Issue \ 9. \ Art. \ No.: \ CD007917.}$ 

DOI: 10.1002/14651858.CD007917.pub2.

www.cochranelibrary.com



#### [Intervention Review]

# Light therapies for acne

Jelena Barbaric<sup>1</sup>, Rachel Abbott<sup>2</sup>, Pawel Posadzki<sup>3</sup>, Mate Car<sup>4</sup>, Laura H Gunn<sup>5</sup>, Alison M Layton<sup>6</sup>, Azeem Majeed<sup>4</sup>, Josip Car<sup>3,7,8</sup>

<sup>1</sup>Andrija Stampar School of Public Health, School of Medicine, University of Zagreb, Zagreb, Croatia. <sup>2</sup>Welsh Institute of Dermatology, University Hospital of Wales, Cardiff, UK. <sup>3</sup>Centre for Population Health Sciences, Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore, Singapore. <sup>4</sup>Department of Primary Care and Public Health, Imperial College London, London, UK. <sup>5</sup>Public Health Program, Stetson University, DeLand, Florida, USA. <sup>6</sup>Department of Dermatology, Harrogate and District NHS Foundation Trust, Harrogate, UK. <sup>7</sup>Department of Family Medicine, Faculty of Medicine, University of Ljubljana, Ljubljana, Slovenia. <sup>8</sup>Global eHealth Unit, Department of Primary Care and Public Health, School of Public Health, Imperial College London, London, UK

**Contact:** Josip Car, Centre for Population Health Sciences, Lee Kong Chian School of Medicine, Nanyang Technological University, 3 Fusionopolis Link, #06-13, Nexus@one-north, Singapore, 138543, Singapore. josip.car@imperial.ac.uk, josip.car@ntu.edu.sg.

Editorial group: Cochrane Skin Group.

Publication status and date: New, published in Issue 9, 2016.

**Citation:** Barbaric J, Abbott R, Posadzki P, Car M, Gunn LH, Layton AM, Majeed A, Car J. Light therapies for acne. *Cochrane Database of Systematic Reviews* 2016, Issue 9. Art. No.: CD007917. DOI: 10.1002/14651858.CD007917.pub2.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

#### **ABSTRACT**

# **Background**

Acne vulgaris is a very common skin problem that presents with blackheads, whiteheads, and inflamed spots. It frequently results in physical scarring and may cause psychological distress. The use of oral and topical treatments can be limited in some people due to ineffectiveness, inconvenience, poor tolerability or side-effects. Some studies have suggested promising results for light therapies.

#### **Objectives**

To explore the effects of light treatment of different wavelengths for acne.

### **Search methods**

We searched the following databases up to September 2015: the Cochrane Skin Specialised Register, CENTRAL, MEDLINE, Embase and LILACS. We searched ISI Web of Science and Dissertation Abstracts International (from inception). We also searched five trials registers, and grey literature sources. We checked the reference lists of studies and reviews and consulted study authors and other experts in the field to identify further references to relevant randomised controlled trials (RCTs). We updated these searches in July 2016 but these results have not yet been incorporated into the review.

# **Selection criteria**

We included RCTs of light for treatment of acne vulgaris, regardless of language or publication status.

# **Data collection and analysis**

We used standard methodological procedures expected by Cochrane.

#### Main results

We included 71 studies, randomising a total of 4211 participants.

Most studies were small (median 31 participants) and included participants with mild to moderate acne of both sexes and with a mean age of 20 to 30 years. Light interventions differed greatly in wavelength, dose, active substances used in photodynamic therapy (PDT), and comparator interventions (most commonly no treatment, placebo, another light intervention, or various topical treatments). Numbers of light sessions varied from one to 112 (most commonly two to four). Frequency of application varied from twice daily to once monthly.



Selection and performance bias were unclear in the majority of studies. Detection bias was unclear for participant-assessed outcomes and low for investigator-assessed outcomes in the majority of studies. Attrition and reporting bias were low in over half of the studies and unclear or high in the rest. Two thirds of studies were industry-sponsored; study authors either reported conflict of interest, or such information was not declared, so we judged the risk of bias as unclear.

Comparisons of most interventions for our first primary outcome 'Participant's global assessment of improvement' were not possible due to the variation in the interventions and the way the studies' outcomes were measured. We did not combine the effect estimates but rated the quality of the evidence as very low for the comparison of light therapies, including PDT to placebo, no treatment, topical treatment or other comparators for this outcome. One study which included 266 participants with moderate to severe acne showed little or no difference in effectiveness for this outcome between 20% aminolevulinic acid (ALA)-PDT (activated by blue light) versus vehicle plus blue light (risk ratio (RR) 0.87, 95% confidence interval (CI) 0.72 to 1.04, low-quality evidence). A study (n = 180) of a comparison of ALA-PDT (activated by red light) concentrations showed 20% ALA was no more effective than 15% (RR 1.05, 95% CI 0.96 to 1.15) but better than 10% ALA (RR 1.22, 95% CI 1.05 to 1.42) and 5% ALA (RR 1.47, 95% CI 1.19 to 1.81). The number needed to treat for an additional beneficial outcome (NNTB) was 6 (95% CI 3 to 19) and 4 (95% CI 2 to 6) for the comparison of 20% ALA with 10% and 5% ALA, respectively.

For our second primary outcome 'Investigator-assessed changes in lesion counts', we combined three RCTs, with 360 participants with moderate to severe acne and found methyl aminolevulinate (MAL) PDT (activated by red light) was no different to placebo cream plus red light with regard to change in inflamed lesions (ILs) (mean difference (MD) -2.85, 95% CI -7.51 to 1.81), percentage change in ILs (MD -10.09, 95% CI -20.25 to 0.06), change in non-inflamed lesions (NILs) (MD -2.01, 95% CI -7.07 to 3.05), or in percentage change in NILs (MD -8.09, 95% CI -21.51 to 5.32). We assessed the evidence as moderate quality for these outcomes meaning that there is little or no clinical difference between these two interventions for lesion counts.

Studies comparing the effects of other interventions were inconsistent or had small samples and high risk of bias. We performed only narrative synthesis for the results of the remaining trials, due to great variation in many aspects of the studies, poor reporting, and failure to obtain necessary data. Several studies compared yellow light to placebo or no treatment, infrared light to no treatment, gold microparticle suspension to vehicle, and clindamycin/benzoyl peroxide combined with pulsed dye laser to clindamycin/benzoyl peroxide alone. There were also several other studies comparing MAL-PDT to light-only treatment, to adapalene and in combination with long-pulsed dye laser to long-pulsed dye laser alone. None of these showed any clinically significant effects.

Our third primary outcome was 'Investigator-assessed severe adverse effects'. Most studies reported adverse effects, but not adequately with scarring reported as absent, and blistering reported only in studies on intense pulsed light, infrared light and photodynamic therapies. We rated the quality of the evidence as very low, meaning we were uncertain of the adverse effects of the light therapies.

Although our primary endpoint was long-term outcomes, less than half of the studies performed assessments later than eight weeks after final treatment. Only a few studies assessed outcomes at more than three months after final treatment, and longer-term assessments are mostly not covered in this review.

# **Authors' conclusions**

High-quality evidence on the use of light therapies for people with acne is lacking. There is low certainty of the usefulness of MAL-PDT (red light) or ALA-PDT (blue light) as standard therapies for people with moderate to severe acne.

Carefully planned studies, using standardised outcome measures, comparing the effectiveness of common acne treatments with light therapies would be welcomed, together with adherence to the Consolidated Standards of Reporting Trials (CONSORT) guidelines.

#### PLAIN LANGUAGE SUMMARY

#### The use of light as a therapy for acne

#### What is the aim of this review?

The aim of this Cochrane Review was to find out whether treatment using lasers and other light sources improves the whiteheads and blackheads, and inflamed spots that people with acne have. We also wanted to know how people with acne assessed their own improvement, and whether they found that these therapies caused unpleasant effects like blistering or scarring. Cochrane researchers collected and analysed all relevant studies to answer these questions and found 71 studies, with a total of 4211 participants.

#### What was studied in this review?

Acne is a common skin problem. It causes blackheads, whiteheads and inflamed spots, and may lead to scarring. Current treatment options are limited in their effectiveness and convenience, and may cause side-effects. We investigated lasers and other light sources, which are used as an alternative therapy, either on their own or in combination with a chemical that makes the skin more sensitive to the light source (photodynamic therapy (PDT)). We compared different light therapies with other treatment options, no treatment, or placebo.

Most studies included people with mild to moderate acne in their twenties. Light treatments in these studies varied greatly in many important aspects, such as wavelength of light used, duration of treatment, chemicals used in photodynamic therapy, and others.



Over half of the studies were industry sponsored; study authors reported either conflict of interest, or such information was not declared.

#### **Key messages**

We are unable to draw firm conclusions from the results of our review, as it was not clear whether the light therapies (including PDT) assessed in these studies were more effective than the other comparators tested such as placebo, no treatment, or treatments rubbed on the skin, nor how long the possible benefits lasted.

#### What are the main results of this review?

We investigated how people with acne assessed their own improvement, but it was not clear whether the light therapies in the studies had a beneficial effect. Evidence on how investigators assessed changes in numbers of blackheads, whiteheads and inflamed spots in people with acne was also limited for most types of light therapies, due to variation in the way the studies were conducted and measured.

Most studies reported side-effects, but not adequately. Scarring was reported as absent, and blistering was reported in studies on intense pulsed light, infrared light and on PDT.

Three studies, with a total of 360 participants with moderate to severe acne, showed that photodynamic therapy with methyl aminolevulinate (MAL), activated by red light, had a similar effect on changes in numbers of blackheads, whiteheads and inflamed spots when compared with placebo cream with red light. We judged the quality of this evidence moderate.

Future well planned studies comparing the effectiveness of common acne treatments with light therapies are needed to assess the true clinical effects and side-effects of light therapies for acne.

#### How up to date is this review?

This review included studies up to September 2015.