

# The effectiveness of laser treatments for onychomycosis in adults in the community: a systematic review thesis

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Thesis submitted in fulfillment of the requirements of the Master of Clinical Science,  
School of Translational Health Science,  
Faculty of Health Sciences,  
The University of Adelaide

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## **Abstract**

### **Background**

There is growing public interest in the application of laser therapy to common nail conditions such as onychomycosis, where traditional pharmaceutical options are long-term, expensive, messy and often unsuccessful, and suited to a limited demographic. Recent reviews highlighting the potential of laser therapies to offer effective, convenient, short duration treatment regimens have not demonstrated the effectiveness of different laser types and treatment modalities creating the need for further detailed research. This systematic review identifies, critically appraises, synthesises and presents the best available evidence for the effectiveness of laser treatments on onychomycosis of the nails in adults living in the community. The specific review question was: can laser treatment of onychomycotic nails produce outcomes comparable to the current 'gold standard' treatment of oral terbinafine over a minimum 12 week treatment period, for adults living in the community?

### **Methods**

A three step search strategy for published and unpublished studies in English language, in the date range 1/1/1985 to 30/6/2013 resulted in nine studies being critically appraised by two independent reviewers using the Joanna Briggs Institute Meta Analysis of Statistics, Assessment and Review Instrument (MAStARI). Seven papers were included for data extraction and synthesis. The primary outcome was cure or clinical response defined by at least 3mm of clear nail growth in a three to 12 month period, or negative microscopy (periodic acid-Schiff [PAS] or potassium hydroxide [KOH] and negative mycological culture [mycological cure]). Complete cure was defined as totally clear nail with negative culture and microscopy (PAS or KOH).

### **Main Findings**

There was a weak association that neodymium-doped yttrium aluminum garnet Nd:YAG 1064nm laser for the treatment of onychomycosis in adults could produce clear nail growth and a mycological cure in a 12 week period. Although there is a plethora of laser therapy options currently on the market, evidence is either of poor quality and a measurable effect cannot be identified, or is absent, to the point that it is not possible to objectively evaluate claims of benefit. Practitioners should be aware of there are significant gaps in the evidence, and that current evidence only supports Nd:YAG 1064nm laser therapy.

### **Interpretation**



Before a new intervention is implemented, there should be clear evidence of benefit in direct head-to-head comparative studies against a known gold standard intervention. This systematic review found no such evidence related to most forms of laser therapy, and also an absence of evidence for many claims associated with laser therapy. While Nd:YAG 1064nm laser for the treatment of onychomycosis in adults is supported, multi center, randomised studies with good controls and adequate power that directly compare laser therapy against oral terbinafine are needed in order to determine the therapeutic effectiveness of laser therapy.

The objectives, inclusion criteria and methods of analysis for this review were specified in advance and documented in a protocol,<sup>1</sup> registration number CRD42013006731 in PROSPERO.<sup>2</sup>

Initial keywords used were: laser, light therapy, mycoses, onychomycosis, and *Trichophyton rubrum*.

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