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Review

Management of recurrent aphthous ulcers using low-level lasers: A systematic review

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ABSTRACT

Background and objective: The exact etiology of recurrent aphthous ulcers (RAS) is unknown. The management of RAS is not always straightforward. The aim of this review is to critically analyze and summarize the clinical literature focusing on the management of aphthous ulcers using low-level lasers.

Materials and methods: The Medline (PubMed), Web of Knowledge (ISI), Cochrane Central Register of Controlled Trials (CENTRAL) and Embase databases were searched electronically for studies published in last 20 years (1995–2015) using the keywords ''recurrent aphthous stomatitis,'' ''aphthous ulcers,'' and ''laser.''

Results: A total of 85 articles were found during the initial search; 76 studies were excluded for not fulfilling the criteria whereas nine studies were deemed suitable for this review. Among the included studies, two articles were case reports and seven were randomized clinical trials. Study design, sample size, type of intervention and control of each study were critically analyzed and summarized according to the CONSORT protocol. In majority of the patients, immediate pain relief and accelerated ulcer healing was observed following irradiation with lasers.

Conclusions: Although various types of lasers have succeeded in providing immediate pain relief to patients, carbon dioxide (CO_2) lasers have the unique advantage of requiring a short

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exposure time (5–10 s). In order to ascertain the efficacy of laser for treating ulcers in the clinical setting, more clinical trials are required.

1. Introduction

Recurrent aphthous stomatitis (RAS) is a pathological condition that is characterized by recurrent ulceration of oral mucosa [1]. These ulcers are usually ovoid or round lesions, having yellow or gray floors and erythematous haloes [1]. According to Shulman, RAS is the most common ulcerative affliction of the oral mucosa in the United States of America [2]. Although a variety of predisposing factors such as immunity, systemic diseases and local factors have been thought to cause RAS. However, the exact etiology of RAS remains unknown [3,4]. There are three main types of RAS have been documented in the literature: minor, major and herpetiform [4]. Minor RAS, the most common form, is characterized by small, recurrent and round ulcers that heal within 10–14 days without leaving any scars in the oral cavity. Major RAS is characterized by painful ulcers greater than 5 mm in diameter that heals within 6 weeks, frequently leaves scars. Herpetiform RAS is described as clusters of numerous pinpoint ulcers that heal in approximately 10 days. Management of RAS mainly consists of supportive therapy including administration of systemic and local corticosteroids, antiseptic, analgesics, antibiotics and immunomodulatory drugs [5]. No precise etiology is known for RAS. Its management mostly consists of symptomatic treatment and patients have to undergo considerable amount of discomfort due to the ulceration for several days even following administration of aforementioned drugs [6].

Laser is an acronym of ''Light Amplification by Stimulated Emission of Radiation'' and is based on the principles laid down by Albert Einstein. Lasers function by emitting light through optical amplification of a medium RAS. Each type of laser is named according to the active medium present. For example, CO_2 laser uses carbon dioxide [7], Nd:YAG laser uses neodymium-doped (Nd) yttrium aluminum garnet (YAG) crystals [8], diode laser uses a semi-conductor diode [9] and a GaAlAs laser uses aluminum gallium arsenide as an active medium [10]. More recently, lasers have been used to treat various forms of oral lesions including RAS [11,12]. Studies have suggested that low-level laser therapy (LLLT) has the potential to treat aphthous ulcer and related lesions [13]. In addition to reducing the pain and discomfort, LLLT also stimulates healing of ulcers [14]. To the best of our knowledge, no reviews summarizing the efficacy of lasers in treating aphthous ulcers have been published to date. Therefore, the aim of this review is to critically evaluate and summarize clinical studies to ascertain whether laser therapy is an effective treatment option for treating aphthous ulcers.

2. Materials and methods

The search methodology employed for this review to find relevant articles is summarized in Figure. The Medline (PubMed), Web of Knowledge (ISI), Cochrane Central Register of Controlled Trials (CENTRAL), and Embase databases were searched electronically for studies published in the last twenty years (1995–2015) using the keywords ''recurrent aphthous stomatitis,'' ''aphthous ulcers,'' and ''laser.'' The primary and secondary searches were conducted by two researchers (S.N. and Z.K.) independently. Any disagreements were resolved by mutual agreement via discussion. Both the researchers also assessed the quality of the studies included according to the CONSORT (Consolidated Standards of Reporting Trials) statement [15].

The inclusion criteria for our search comprised of the following:

1. Randomized clinical trials (RCT)
2. Retrospective studies
3. Case series and reports
4. Laser treatment of only oral aphthous ulceration
5. Articles in English

The exclusion criteria for our search comprised of:

1. Animal studies
2. Laser treatment of extra-oral ulceration and wounds
3. In vitro studies
4. Laser treatment of non-aphthous lesions
5. Letters to the editor

The titles and abstracts of studies obtained in our primary search were read thoroughly to search for further articles meeting our inclusion criteria. Furthermore, the studies cited in the articles were also scanned to find any more published research suitable for this review.

Following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines [16], a focused question was produced according to the Participants, Interventions, Control and Outcomes (PICO) principle [17]. The focused question for this review was ''In RAS patients, compared to placebo and conventional treatment, what is the efficacy of low-level laser therapy effective in promoting the healing of oral ulceration?''

3. Results

A total of 85 articles were found during the initial search. Upon applying the aforementioned exclusion and inclusion criteria,

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