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Review

Role of antifungal medicaments added to tissue conditioners: A systematic review

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ABSTRACT

Purpose: The aim of this review is to investigate the current state of knowledge on the incorporation of antifungal agents into the tissue conditioners for the treatment of denture induced stomatitis.

Study selection: Studies reporting the incorporation of antifungal/antimicrobial agents in to tissue conditioners were included in the review. In order to search the studies on the topic “incorporation of antifungal agents in tissue conditioners for the treatment of denture induced stomatitis” ISI web of science, PubMed/MEDLINE, and Google-Scholar databases were searched from 1970 up to and including July 2015 using various keywords such as antifungal agents, tissue conditioners, *Candida albicans*, denture stomatitis, etc.

Results: Various studies reported the efficacy and effectiveness of adding conventional organic antifungal medicines (nystatin, azole group derivatives and chlorhexidine, anti-microbials/antifungals other than organic (silver zeolite, silver nano-particles, photo-catalysts and metallic oxides) and natural and herbal antimicrobials (tea tree oil, lemongrass essential oil and organum oil) into various tissue conditioners. The review literature reported that incorporation of antifungal agents into tissue conditioners is effective with minimal or no effects on physical and mechanical properties of tissue conditioners.

Conclusions: Incorporation of different antifungal medicaments to commercially available tissue conditioners can be recommended for the management of denture induced stomatitis.

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1. Introduction

Denture stomatitis is a pathological condition of the denture bearing mucosa caused by trauma from ill-fitting dentures [1,2]. It is characterized by generalized inflammation or reddening of the palatal mucosa underneath the denture and more prevalent in complete denture wearers [3]. A significant proportion of denture wearers (72%) are affected by this condition [4]. The fungal (candidal) infections are considered to be the main contributory factor for developing the denture stomatitis hence commonly termed as Candida-associated stomatitis [5–7]. The etiology of denture stomatitis can be multifactorial however, the infection by *Candida* species especially the *Candida albicans* (*C. albicans*), is considered to be the main etiologic factor [8]. In addition to *C. albicans*, other risk factors such as denture trauma [9], poor oral and denture hygiene, continuous and nocturnal denture wear [10], xerostomia [11], alteration in salivary pH [12] have been reported to be associated with denture stomatitis.

C. albicans is the most prevalent species among oral fungal infections. It has been estimated that 93% of denture stomatitis patients are linked to *C. albicans* fungal infections [13,14]. However, other fungal species such as *Candida glabrata* [15] and *Candida tropicalis* are often associated with the denture surfaces and the palatal mucosa of healthy denture wearers [13,16,17]. *C. albicans* is an oral commensal found in 40% of human beings and has a role in the formation of denture plaque [18]. In conditions of trauma and poor oral hygiene, adhesion of *C. albicans* to continuously worn denture base usually causes denture stomatitis [19]. The oral antimicrobial peptides present in human saliva have antifungal defense [20], however may not be enough in certain cases such as poor oral hygiene, denture wearers and may need therapeutic management. The management of candida associated denture stomatitis is complex due to its multi-factorial etiology [21]. A wide range of treatment modalities [12,13,21,22] have been used (Fig. 1). However, all treatment modalities are more or less supportive and may not be effective for every patient [23–25].

Tissue conditioners are resilient materials that are often used for conditioning the denture bearing mucosa soled by ill-fitting dentures. They act as a cushion under the dentures and decrease the loads borne by the denture bearing mucosa [26]. Tissue conditioners have been used as drug delivery tools to the oral cavity [26,27], for example, antifungal agents delivered through tissue conditioners inhibited *C. albicans* [23,28]. Topical antifungal therapy for denture stomatitis is challenging to apply in geriatric denture-wearers due to reduced motor activity, cognitive impairment, and memory loss [21]. In addition, maintaining an efficient dose of topical antifungals

in the oral cavity is also challenging. The delivered antifungal agents fail to adhere and remain in contact with oral mucosal tissue due to factors such as regular ingestion and constant wash out by the salivary flow [29].

To overcome these problems, antifungal agents have been incorporated in tissue conditioners to investigate their effectiveness against *C. albicans* [30–37]; for example nystatin [30–36], azole group derivatives [34–36,38], chlorhexidine [36,39,40] have been reported with varying degree of success. Recently other antifungal agents such as metallic oxide powders [41], natural and herbal oils [35,42–45], photocatalysts [46] and silver nanoparticles [47] into tissue conditioners have been investigated. Various researchers probed modified tissue conditioners in terms of effectiveness [48], efficacy [31], drug delivery method [33], the stability and duration of antifungal activity [35], the dimensional changes and stability [37,40,44,49–52]. Although there are a large number of scientific papers have been published yet the recommendations on the incorporation of antifungal/antimicrobial agents in tissue conditioners for the treatment of denture stomatitis remain unclear. The aim of this review is to investigate the role of antifungal agents incorporated in the tissue conditioners for the treatment of denture induced stomatitis. In addition, various factors affecting the efficiency of tissue conditioners have been discussed.

2. Study selection

2.1. Focus question

The focused question was;

“Is the incorporation of antifungal/antimicrobial medications to tissue conditioners significantly beneficial to treat denture stomatitis”?

2.2. Literature search and selection criteria

In order to address the focused question, a systematic literature search was carried on using online data bases, ISI Web of Science, Google-Scholar and PubMed/MEDLINE from 1970 up to and including July 2015. Various combinations of following keywords were used to search the databases: “antifungal agents,” “tissue conditioners,” “denture induced stomatitis” and “sore mouth” (Fig. 2). The original studies and clinical studies reporting the incorporation of any antifungal/antimicrobial agents in tissue conditioners were included in the review. Any studies conducted using permanent soft/resilient liners, cold cured acrylics and permanent denture base materials were excluded. Any unpublished data, reviews,

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