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Review article

Evaluation of oxidative stress in oral lichen planus using malonaldehyde: A systematic review

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Abstract

Background: Oral lichen planus is a chronic, mucocutaneous, inflammatory disease, with an unknown aetiology. Reactive Oxygen Species and oxidative damage to the tissues might be the cause. Malonaldehyde, a low molecular weight end product of lipid peroxidation reaction is a suitable biomarker of endogenous DNA damage.

Aims: To analyse the existing literature on the "evaluation of oxidative stress in oral lichen planus using malonaldehyde as a biomarker".

Methods: Electronic search of scientific papers was carried out in Pubmed (MeSH), Science direct and Cochrane databases using specific keywords. Eight articles were finally selected that formed the base for this review.

Results: The findings from the present review demonstrate that oxidative stress and consequently, elevated levels of malonaldehyde compared to controls, plays a role in the pathophysiology of oral lichen planus. In the eight relevant studies, estimation of the malonaldehyde in serum, saliva and tissue samples was done and its levels were found to be significantly higher than controls.

Conclusion: This review reveals only 8 studies that demonstrate the elevated oxidative stress levels in oral lichen planus using malonaldehyde as a biomarker. Therefore, further studies need to be performed which would estimate the levels of MDA in serum, saliva and tissue samples of the same group of patients with oral lichen planus, so as to draw definitive conclusions and significant correlation between the MDA levels from the three samples.

Keywords: Oral lichen planus; Precancerous condition; Malonaldehyde; Oxidative stress

Contents

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1. Introduction

Lichen planus (LP) is a chronic inflammatory condition that may affect the skin, scalp, nails, mucous membranes (especially mouth), and the genitalia (Ismail et al., 2007). The origin of this cellular degeneration is believed to be attributed to sub epithelial infiltration of T-lymphocytes that contributes to the local production of cytokines which in turn can stimulate production of Reactive Oxygen Species (ROS) and cause oxidative damage to the tissues (Khan and Farah, 2003). An overall age-standardised global prevalence of OLP is 1.27% (0.96% in men and 1.57% in women) in the general population (McCartan and Healy, 2008). It is seen mostly in the fifth to sixth decades of life, and is twice as common in women as in men (Carrozzo and Gandolfo, 1999; Saran et al., 2008). In 2003, the modified World Health Organisation diagnostic criteria for OLP came into effect, according to which, a diagnosis of OLP required fulfilment of both clinical and histopathologic criteria as mentioned in Table 1, (van der Meij and van der Waal, 2003). In recent years, there has been an increasing research interest in oxidation of biological systems including free radicals, Reactive Oxygen Species (ROS), oxidative stress and antioxidant defence mechanisms in inflammatory and chronic degenerative diseases and during carcinogenesis (Sertan et al., 2011; Chole et al., 2010; Agha-Hosseini, 2012). Oxidative stress results from the metabolic reactions that use oxygen and represents a disturbance in the equilibrium status of pro-oxidant/antioxidant reactions in living organisms (Valko et al., 2007). It has been found that ROS produced by keratinocytes, fibroblasts and various inflammatory cells could result in disequilibrium between the pro-oxidants and antioxidants (Fuchs et al., 2001). Reactive oxygen metabolites lead to destruction and damage to cell membranes by lipid peroxidation (Sertan et al., 2011). MDA is the principal and most studied product of polyunsaturated fatty acid peroxidation (Nielsen et al., 1997). MDA can combine with several functional groups of molecules including proteins, lipoproteins, RNA and DNA. (McCartan and Healy, 2008). The endogenous formation of MDA during intracellular oxidative stress and its reaction with biologically important macromolecules makes MDA-DNA adducts a suitable biomarker of endogenous DNA damage (Saran et al., 2008). There are limited reviews on the existing literature providing information on the role of oxidative stress in oral lichen planus. Hence this systematic review aims to analyse the existing literature on the "evaluation of oxidative stress in patients with Oral lichen planus using MDA (end product of lipid peroxidation) as a biomarker".

2. Methods

2.1. Search strategy for identification of studies

A systematic literature search was done to identify articles describing oxidative stress in oral lichen planus. Electronic search of scientific papers was carried out in Pubmed (MeSH), Science direct and Cochrane databases using specific keywords. A total of 49 articles were found. Pubmed search yielded 21 papers, Science direct search yielded 26 papers and Cochrane search yielded 0 papers. Hand search for relevant articles yielded 2 papers; after excluding the common search articles, 39 articles were found to be irrelevant based on the title and abstract. After

Table 1
Modified world health organisation diagnostic criteria for oral lichen planus.

Sl. No	
CLINICAL CRITERIA	
1	Presence of bilateral, more or less symmetrical lesions
2	Presence of a lacelike network of slightly raised grey-white lines (reticular pattern)
3	Erosive, atrophic, bullous and plaque type lesions are accepted only as a subtype in the presence of reticular lesions elsewhere in the oral mucosa
4	In all other lesions that resemble OLP but do not complete the above mentioned criteria, the term "clinically compatible with" should be used
HISTOPATHOLOGIC CRITERIA	
1	Presence of a well-defined band-like zone of cellular infiltration that is confined to the superficial part of the connective tissue, consisting mainly of lymphocytes
2	Signs of liquefaction degeneration in the basal cell layer
3	Absence of epithelial dysplasia
4	When the histopathologic features are less obvious, the term "histopathologically compatible with" should be used