

**EFFECTS OF THE USE  
OF CURCUMIN IN  
PATIENTS WITH ORAL  
LESIONS:  
A LITERATURE REVIEW**

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**Abstract:** Curcumin is a phytotherapeutic extracted from turmeric that has Turmeric in its composition. In the meantime, it is observed in the sociocultural context that its use has been widely used to treat some oral lesions in dentistry, highlighting its effects on Carious Lesions (LC), Recurrent Aphthous Stomatitis (RAS), Oral Lichen Planus (LPO) and oral mucositis (OM). In order to verify the effects of using curcumin in patients with oral lesions, a search was carried out on the SciELO platform and on the scientific databases Science Direct, Scopus, PubMed, VHL (Medline, LILACS), using the descriptors “curcumin”, “oral lesions” and “dentistry” with the help of the Boolean operator “and”, in addition to delimiting the search for systematic review studies, in the time interval 2017 to 2022. 361 scientific articles were found, but only 5 articles were selected because they meet the objective of the present study. Curcumin has anti-inflammatory, antioxidant, anticancer and immunomodulatory effects. From this perspective, oral lesions treated with curcumin promote in CL cases the reduction of bacterial activity and biofilm reduction, also in RAS cases, relief of the signs and symptoms of the disease, as well as in OLP cases, reducing pain, burning sensation and clinical appearance of lesions and cases of OM, which reduce pain, erythema intensity, ulceration area and even the degree of severity of this condition. Thus, it is observed that the use of curcumin in the face of the aforementioned oral lesions has several beneficial effects, given its high anti-inflammatory, antioxidant, antibacterial, immunomodulatory and, above all, anticancer potential, which reduces the signs and symptoms of CL, RAS conditions, LPO and MO.

**Keywords:** Curcumin, Oral injuries, Dentistry.

## INTRODUCTION

Knowledge of epidemiological data about the main oral lesions is of unquestionable relevance for dental surgeons, as they provide information on the prevalence of alterations and diseases that they will certainly encounter in their clinical practice. (HOFF; SILVA; CARLI, 2015).

In the foreground, Ehteshami et al. (2021) present Caries Lesion (LC) as one of the most frequent oral diseases with worldwide prevalence, which has a multifactorial etiology, with emphasis on factors such as dental enamel composition, diet and cariogenic bacteria. The disease develops from oral dysbiosis, which allows the deposition of bacterial acids on enamel and dentin, an example of this is what occurs with the bacterium *Streptococcus mutans* (*S. mutans*), considered the main cause of plaque formation and dental caries.

From this perspective, the symptoms of CL occur when the lesion reaches the dentin, pulp and periodontium, which, consequently, will trigger an inflammatory process that can have serious effects, such as intense pain. (LIMA, 2007).

Another disease with a high prevalence is Recurrent Aphthous Stomatitis (RAS) which is characterized as inflammatory painful oral ulcers, visibly small, round or ovoid, recurrent and with circumscribed margins. The etiology of RAS is still uncertain, even with many studies already developed, which point to some possibilities such as trauma, genetic predisposition, vitamin deficiency, psychological stress and hematological and immunological disorders. (AL-MAWERI et al., 2020).

In addition, another disease that needs a careful look is Oral Lichen Planus (OLP), given its chronic course and potential for malignancy. OLP is characterized by the presence of an erosive/ulcerated mucosa, with peeling gums and containing diffuse white

streaks, which has an etiology linked to an unknown trigger. (LV et al., 2018)

However, the pathogenesis of OLP is better defined, as there is a dysregulated response of T lymphocytes on basal keratinocytes, which leads to apoptosis, cellular degeneration and release of chemokines at the site of inflammation. (CANTO et al., 2010)

In addition, it is extremely important to know about another condition called oral mucositis (OM), which appears as one of the consequences of anticancer treatment, such as chemotherapy and radiotherapy of the head and neck, the latter being linked to a higher incidence of cases. OM presents as an erythema and a burning sensation, it is also worth mentioning that when it evolves into an ulcerative lesion, it is extremely painful, which affects activities of daily living (ADL) such as speech and eating. (NORMANDO et al., 2019)

In this context, after observing some oral lesions with a high incidence and the need for proper management, the use of medicinal plants as an alternative or complementary therapy has been highlighted, given their rich arsenal of chemical, organic and inorganic components. (PEDROSO; ANDRADE; PIRES, 2021)

Therefore, the growing use of phytotherapy was observed, as well as greater dissemination of knowledge about its therapeutic benefits. In the meantime, it is worth pointing out a very important herbal medicine, curcumin (CUR), a polyphenol extracted from *Turmeric longa* known as turmeric, since this plant has several effects such as antioxidant, anti-inflammatory, antimicrobial, antiviral and, above all, anticancer. (VICTORIO et al., 2021)

Based on the above information, it is therefore necessary to ask the following question: “does the use of curcumin have effects on oral lesions?”. Thus, the present

study aims to verify the effects of the use of curcumin in patients with lesions oral.

## METHODOLOGY

The present research is characterized as an integrative literature review, whose main theme refers to the use of curcumin in patients with oral lesions. This methodology makes it possible to fully elucidate a specific subject, in addition to enhancing its understanding, since it is able to “enable the synthesis and analysis of scientific knowledge already produced on the investigated topic” (BOTELHO; CUNHA; MACEDO, 2011, p. 133).

Regarding the type of study, this is a descriptive qualitative, which used as a source of knowledge the scientific databases Science Direct, Scopus, PubMed, VHL (Medline, LILACS) and the Scielo search platform, with the intention of locating the literature corresponding to the central theme of the research.

Initially, the topic in question was read, focusing on the use of curcumin in patients with oral lesions. From this, the objective of the study was defined in order to verify the effects of the use of curcumin in patients with oral lesions.

Soon after, the inclusion criteria were chosen: systematic review articles, original articles, articles that addressed the effects of the use of curcumin in oral lesions, scientific publications in the English language and inserted within the time period from 2017 to 2022.

Then, the exclusion criteria were defined: theses, monographs, editorials, duplicate articles, opinion articles, abstracts published in congresses/seminars, incomplete publications that did not address the research focus.

To carry out the search in the databases and on the platform, the descriptors pre-selected through the DeCS (Health Sciences Descriptors): Curcumin (Curcumin),

Oral Lesions (Oral Lesions) and Dentistry (Dentistry) were considered. These were operationalized in the search process, during the period from January to March 2022, with the help of the Boolean operator “AND”, as it allows achieving greater specificity of information by crossing the descriptors in their respective databases and platform.

Subsequently, the choice of articles that would compose the study was carried out, which were selected by reading the title and abstract, taking into account the pre-established inclusion and exclusion criteria so that, later, they could be fully analyzed, allowing the subdivision of knowledge with the ultimate goal of achieving a better understanding and exposure of the subject. Thus, of the 361 publications analyzed after

the completion of the filters, only 5 articles fit the scope of this research. The search and selection path performed can be better understood through figure 1.

As for the data analysis stage, a brief reading of the selected articles was performed, focusing on the methodological particularities and results presented, in order to obtain information related to the use of curcumin in oral lesions. Subsequently, a second reading of the articles was applied in a more rigorous way, now with the focus directed to the effects of the use of curcumin in patients with oral lesions.

## RESULTS

Table below.

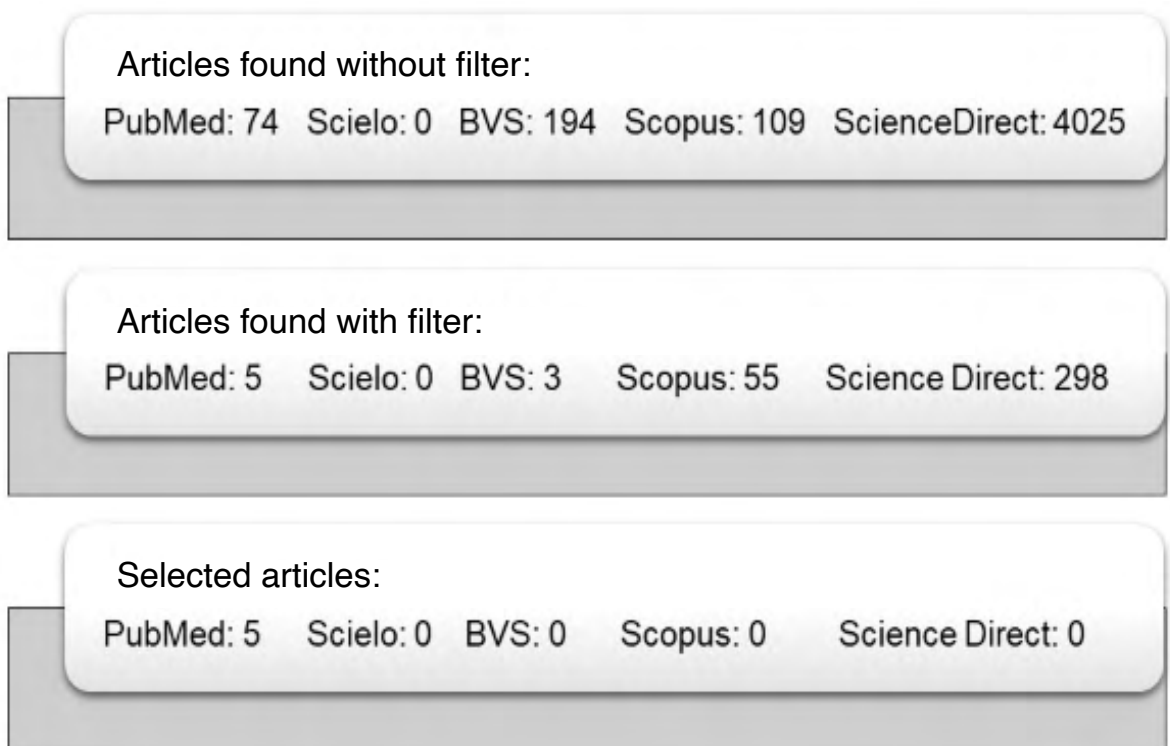


Figure 1: Flowchart of articles found and selected in the search.

Source: Authors, 2022.

AUTHOR/ TITLE / YEAR	OBJECTIVE	RESULTS	CONCLUSION
EHTESHAMI, A. <i>et al.</i> <b>Does Curcumin Have an Anticaries Effect? A Systematic Review of In Vitro Studies.</b> 2021.	The objective was to evaluate the anticaries effect of curcumin .	A total of 753 articles were obtained and only 13 were included, as they met the eligibility criteria. In 12 out of 13 studies, curcumin showed antibacterial and anticaries effects. In addition to promoting inhibition of <i>S. mutans</i> growth, acid production, as well as ATPase and sortase A activity. There was also a reduction in the metabolism and structure of the biofilm and the production of exopolysaccharides (EPS) from the biofilm and, above all, anti-adhesion effects against <i>S. mutans</i> .	It was observed that curcumin had antibacterial effects and anticaries, in addition to inhibiting <i>S. Mutans</i> , as well as inhibiting the growth, production of acid, ATPase and sortase A activity. It is worth mentioning the potential of curcumin in the prevention and treatment of other oral lesions, as it is an affordable herbal medicine safe and inexpensive to increase oral and dental health. Ressalta-se a necessidade de mais estudos.
AL-MAWERI, S. <i>et al.</i> <b>Efficacy of curcumin for recurrent aphthous stomatitis: a systematic review.</b> 2020.	The objective was to organize and summarize the scientific evidence available about the effectiveness of the use of curcumin in the management of Recurrent Aphthous Stomatitis.	Eight studies were obtained containing 439 subjects. We compared the efficacy of curcumin with 1% triamcinolone in 4 studies, glycerin vehicle in 1 study, placebo in 1 study, and honey in 1 study. Research has shown good efficacy of curcumin in reducing pain and ulcer size in patients with RAS. Furthermore, 4 studies found curcumin to be as effective as triamcinolone in relieving the signs and symptoms of RAS. 3 studies showed superior results with curcumin compared to control groups.	It has been observed that curcumin has effects Beneficial in relieving pain and accelerating healing in patients with RAS. It is recommended for the future to carry out well-articulated and standardized clinical trials in the use of curcumin.
GHARIBPOUR, F. <i>et al.</i> <b>The Clinical Use of Curcumin for the Treatment of Recurrent Aphthous Stomatitis: A Systematic Review of Clinical Trials.</b> 2021	The objective was to evaluate the effects of curcumin in cases of Recurrent Aphthous Stomatitis.	We obtained 9 studies containing 469 participants, showed that curcumin treatment reduced aphthous ulcer size (described in 7 studies), pain intensity (described in 8 studies), the number of aphthous ulcers (described in 3 studies), the erythematous halo (described in 1 study), the erythema and exudate of the aphthous disease (described in 1 study). In addition, 4 studies compared the effect of curcumin on aphthous ulcer with the effect of triamcinolone medication. The 9 studies showed that curcumin had beneficial effects drug-like in aphthous ulcers, assessed by ulcer size, number and pain. Only 3 studies rated high quality on the Jadad scale.	Curcumin has been observed to have beneficial effects in the treatment of recurrent canker sores. However, it is recommended that more randomized clinical trials be performed to validate these findings.
LV, K. <i>et al.</i> <b>Clinical safety and efficacy of curcumin use for oral lichen planus: a systematic review.</b> 2018.	The objective was to evaluate the current scientific evidence on the safety of the use of curcumin in the treatment of Oral Lichen Planus, as well as to verify its effectiveness compared to corticosteroids.	Nine studies were obtained, of which 6 were randomized double-blind clinical trials; 2 pilot clinical trials and 1 case report, containing 259 patients with OLP. Of which 7 studies showed statistically significant differences in pain intensity and in the clinical appearance of lesions after using curcumin in treatment for a period of time, when compared to baseline ( $P < 0.05$ ). It is worth noting that 3 controlled clinical trials compared the effectiveness of curcumin with that of corticosteroids, which showed no significant differences in terms of pain intensity and clinical appearance of oral lesions.	It was observed that the use of curcumin is a safe treatment option, in addition to possible use as an adjuvant in combination with corticosteroids to decrease pain intensity, burning sensation and clinical appearance of oral lesions in patients with OLP.

<p>NORMANDO, A. <i>et al.</i> <b>Effects of turmeric and curcumin on oral mucositis: A systematic review.</b> 2019.</p>	<p>The objective was to evaluate the effects of use of curcumin and turmeric in the treatment of oral mucositis in cancer patients undergoing chemotherapy and/ or radiotherapy.</p>	<p>A total of 5 studies were obtained, of which 2 studies were categorized as low and 3 as moderate risk of bias, which showed that the use of turmeric/curcumin made through topical application as a gel or as a mouthwash reduced the degree of mucositis, as well as the intensity of pain, erythema and gives ulcerative area, which points to greater effectiveness in controlling signs and symptoms of oral mucositis.</p>	<p>It was observed that the use of turmeric and daturcumin on OM promoted effects of reducing pain intensity, erythema, ulceration area and, above all, reduced the degree of OM severity. Furthermore, this herbal medicine was effective in delaying the onset of mucositis lesions, which highlights its preventive effect.</p>
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## DISCUSSION

According to Ehteshami et al. (2021), the use of curcumin has bacteriostatic and biofilm-reducing effects, since this herbal medicine acts by destroying the exopolysaccharide (EPS) structure, the main substance produced by *S. mutans* that plays a relevant role in the pathogenesis of caries, since EPS facilitates biofilm development, aggregation and protection of microorganisms. CUR also causes the inhibition of gtfB and gtfC (extracellular glycosyltransferases from *S. mutans*), which explains the reduction in EPS biomass.

Furthermore, CUR promoted inhibition of Sortase A (membrane anchoring protein), which causes anti-adhesion effect on teeth as well as reduces *S. mutans* biofilm formation. It is also worth mentioning the inhibitory effect on the production of acids, as well as on the F-ATPase present in the bacterial membrane. At the end, the VICKER microhardness tester was used, in order to verify how much hardness was reduced on the surface present in the course of the carious lesion, obtaining that CUR has high anti-caries activity when in low concentrations. (EHTESHAMI et al., 2021).

In the study by Gharibpour et al. (2021) the authors present the effects of using curcumin on recurrent aphthous stomatitis, in which there is an anti-inflammatory effect through multiple pathways, which are

downregulation of cytokines, such as most interleukins (IL-1, IL-1 $\beta$ , IL-6 and IL-8), as well as tumor necrosis factor alpha (TNF- $\alpha$ ), phospholipase, cyclooxygenase (Cox-2, -5), lipoxygenase and monocyte chemoattractant protein-1, which explains the great analgesic effect. In parallel, CUR also promotes healing effects through the attenuation of matrix metalloproteinase (MMP)-9 and MMP-2, in addition to promoting greater cell proliferation, synthesis of type 3 collagen, contraction and cross-linking of collagen in wound areas. (LV et al., 2018).

In addition, CUR has antibacterial activity, which inhibits bacterial development around the ulcerated surface, an effect that is vitally important to prevent a superinfection, for example. Another interesting aspect is that curcumin was effective compared to triamcinolone, in addition to not having adverse effects described in the literature, unlike corticosteroids. Thus, it was observed that the CUR achieved a reduction in healing time and promoted the relief of pain intensity caused by the ulcerative lesion present in the RAS. (GHARIBPOUR et al., 2021).

Corroborating and reinforcing the notes seen above, another relevant effect of curcumin on RAS stands out, the antioxidant action that acts by inhibiting the oxidation of cells, inducible nitric oxide synthase (iNOS) and free radicals. (AL-MAWERI et al., 2020; LV et al., 2018).

In this perspective, the authors make an observation for the increased use of corticosteroids and immunomodulators, which are usually used in the treatment of RAS, but with several observed side effects. Therefore, one more incentive for the use of CUR in addition to the many effects described above is its safe use, since current research shows that there are no side effects even at high doses. (AL-MAWERI et al., 2020).

Another perspective is seen by Lv et al. (2018) where the authors direct the use of curcumin to oral lichen planus, due to its great anti-inflammatory potential, which also acts through the negative regulation of inflammatory transcription factors, such as the nuclear factor-kappa beta (NF- $\kappa$ B), activated protein-1 (AP-1), peroxisome proliferator-activated receptor- $\gamma$  (PPAR- $\gamma$ ), cytosines and enzymes. In addition, its antioxidant effect is of great importance, as scientific evidence already shows oxidative stress as an active factor in the pathogenesis of OLP.

In addition, it is worth mentioning that OLP is a lesion that can progress to squamous cell carcinoma, which is another important reason in favor of including CUR in the treatment, given its anticancer potential, which is related to some biological pathways, example of mutagenesis, oncogenic expression, cell cycle regulation, apoptosis, tumorigenesis and even metastasis, thus promoting a chemopreventive and potentiating effect when used in conjunction with other chemotherapeutic drugs, such as 5-fluorouracil. (LV et al., 2018)

In addition to the previous effects, the immunomodulatory activity is of great importance, since it controls the activation of macrophages, natural killer cells and, mainly, the proliferation of T cells, and these effects are very good, since the pathogenesis of OLP is caused by T cell-mediated cytotoxicity,

in addition to reducing pain intensity and clinical appearance of the lesion by anti-inflammatory action. (LV et al., 2018)

Another aspect of the CUR's performance is described by Normando et al. (2019) on oral mucositis, which has a pathogenesis linked to NF- $\kappa$ B, as well as its regulatory factors, such as cytokines, cytokine modulators, stress responders and cell adhesion molecules, which justifies the use of C.U.R. in the treatment, promoting an increased wound healing effect, in addition to reducing the signs and symptoms of mucositis, as well as decreasing the burning sensation and, above all, promoting a reduction in the degree of oral mucositis.

## CONCLUSION

This way, one can recognize the great potential of curcumin on oral lesions as a viable therapeutic alternative for use in patients with diseases such as carious lesion, recurrent aphthous stomatitis, oral lichen planus and mucositis, since this herbal medicine through its effects anti-inflammatory, analgesic, antioxidant, antibacterial, immunomodulatory and, above all, anticancer, promoted beneficial effects, reducing signs and symptoms of these oral lesions and, consequently, improving the health and quality of life of these patients.

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