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Review Article

THE USE OF HERBAL MOUTHWASH THERAPY IN ORAL LICHEN PLANUS: A SYSTEMATIC REVIEW

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ABSTRACT

This study aid to describe the advantages of herbal mouthwash therapy in Oral Lichen Planus (OLP). This systematic review was carried out using PRISMA methods. The selected articles were published in the last five years from PubMed and Google Scholar with the keywords mouthwash, mouth rinse, and Oral Lichen Planus was conducted in June 2022. The assessment of the risk of bias uses the Oxford Scoring System. A total of 2225 journals were found, and seven articles were obtained through screening. After the risk of bias assessment, six articles of high-range quality and one article of low-range quality were obtained. The six journals are randomized clinical trials of herbal mouthwashes and synthetic mouthwashes. Three articles on herbal mouthwash, two articles on synthetic mouthwash, and one article comparing herbal and synthetic mouthwashes. These articles show differences in the time, size, and pain of using herbal and synthetic mouthwashes; they also found side effects when using synthetic mouthwashes compared to herbal mouthwashes. Herbal mouthwash has fewer side effects than synthetic mouthwash, although clinically, synthetic mouthwash is more effective than herbal mouthwash.

Keywords: Mouthwash, Mouth rinse, Oral lichen planus

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INTRODUCTION

Oral Lichen Planus (OLP) is a chronic disease that rarely occurs in spontaneous remission and affects most of the oral mucosa, tongue, and gingiva [1, 2]. The etiology of this disease is still unknown, but the immune system has a significant role in disease development [3]. Factors such as viruses (Hepatitis C), drugs, restorative materials (amalgam), genetic predisposition, and psychological disorders also play a role [4]. Its pathogenesis suggests that cytotoxic T lymphocytes induce apoptosis of basal layer keratinocytes, which leads to the development of a chronic inflammatory process [5]. Autoreactive T lymphocytes have a significant role because these cells cannot distinguish between molecules attached to the body and foreign antigens [3]. Autoreactive T lymphocyte activation is a process that can occur in all parts of the body, including the oral mucosa [6]. OLP epidemiological data suggest this condition affects approximately 0.5%-2.2% of the population, most commonly in adults over 40 [5, 7]. This condition can affect both sexes but is most common in women (female: male 3:2) without a clear racial preference [3, 8]. The clinical presentation of OLP consists of reticular, papular, plaque-like, bullous, erythematous, and ulcerative forms [5]. The reticular, papular, and plaque-like forms usually present without symptoms or pain, apart from a rough surface, whereas the erythematous and ulcerative forms cause pain [3].

OLP is a symptomatic or asymptomatic condition with corticosteroid as the primary treatment [9]. Corticosteroid is a natural, synthetic analog of steroid hormones produced by the cortex of the adrenal glands whose effectiveness stems from their anti-inflammatory and immunosuppressant properties [10]. The topical corticosteroids can be prepared as a solution for gargling, especially if the lesion is extensive or cannot apply ointment/cream as in OLP [6]. There is evidence that topical use of corticosteroids can be absorbed and cause systemic side effects [10]. The most reported side effects of topical corticosteroids are the presence of acute candidiasis, burning sensation, mucosal atrophy, and dry mouth [11]. Another side effect that can occur is hypogeusia and systemic effects such as suppression of the hypothalamic-pituitary-adrenal axis and Cushing's syndrome. Although it rarely occurs, it also can happen if the patient uses high-potency corticosteroids excessively [10].

The oral mucosa is a very responsive and dynamic condition; although it is accessible in therapy, it is also a challenge [12]. Corticosteroids, often used in treating oral diseases, also have side effects [9]. Research on herbal products is carried out to obtain their potential in medicine as an alternative to synthetic materials, which, although more efficacious, have side effects for patients [13].

Mouthwash preparations are more accessible to apply to the mouth than ointments, pastes, or creams [14] because the user can control the contact time of the drug with the oral mucosa or where access may be difficult [15]. The disadvantage of mouthwash is that all the mucosa, including healthy ones, is also affected [15].

MATERIALS AND METHODS

The systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) [16]. The selected articles were from two electronic databases, PubMed and Google Scholar. Article searches are also carried out manually according to topics related to the theme but are not identified in the search or based on the selected article bibliography. The search for articles was carried out from 15 to 19 June 2022. The systematic review uses the Population, Intervention, Comparison, and Outcome (PICO) method based on the purpose of writing. The populations are the Oral Lichen Planus (OLP) articles; intervention with mouthwash; the comparison has not been determined at the beginning of the study but will be explained according to the articles found; the outcome is a change in the patient's condition, namely a decrease in the size of the lesion, a decrease in pain, the efficacy of mouthwash and the side effects. The keywords used in the article search process were “mouthwash” OR “mouth rinse” AND “Oral Lichen Planus”.

The article search applies inclusion criteria consisting of clinical trial design, a study on humans, articles in the last five years (2017 to 2022), articles using English, and full text that can be accessed. The excluded articles are articles that are not relevant to the topics discussed, namely mouthwash and Oral Lichen Planus, literature reviews, articles other than English, and articles that are not accessible. The next step is assessing the risk of bias in each article to determine the quality of the report using the Oxford Quality Scoring System. This system consists of 5 questions to evaluate the randomization, the double-blinding method used in the articles studied, and any withdrawals and dropouts. The assessment criteria

are a maximum of 5 and a minimum of -2. Articles with values between 3 to 5 are considered high quality, while articles with values of-2 to 2 are regarded as low quality [17, 18].

RESULTS

The search for study articles was carried out on two electronic databases, namely PubMed and Google Scholar, with the keywords "mouthwash" OR "mouth rinse" AND "Oral Lichen Planus". A total of 2225 articles were obtained from the search, and three articles were found from the manual search, so the total number of articles to be screened amounted to 2228. The next step is the applicating of the specified inclusion and exclusion criteria. Because of did not meet the criteria, 2221 articles were excluded, and seven articles were appropriate. After the risk of bias assessment from the articles, there are six high-quality articles and one low-quality article. The article search and selection process can be seen in fig. 1, while the risk of bias assessment is shown in table 1.

Based on table 1, 6 articles with high quality will be the study because they are considered high quality. The next step is to summarize each article that presents information, including the author, country, year of study, the number of patients, therapy (mouthwash) given, duration of treatment, results, side effects, and Scopus index (table 2). The success of therapy is further illustrated in tables 3 and 4 by comparing the decrease in the size of the ulcer (table 3) and the comparison of the decrease in the pain score (table 4).

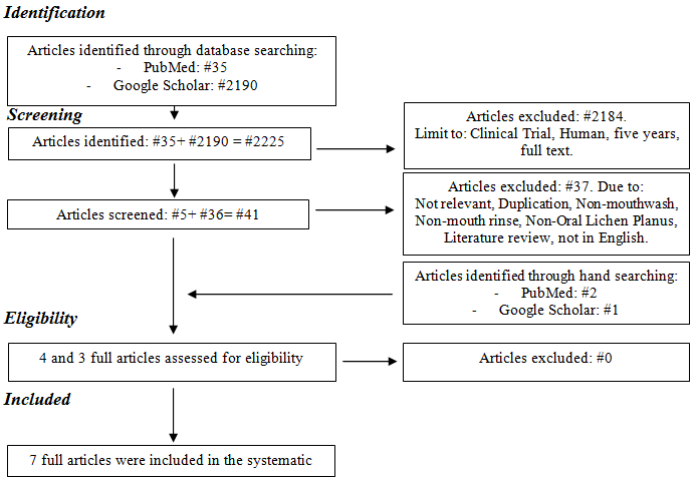

Fig. 1: PRISMA flow diagram of articles search

Table 1: Risk of bias assessment and quality for the reviewed articles

No	Risk assessment of bias and quality (Answer formulation)	Authors						
		Mansourian, *et al.* [19]	Zaslansky, *et al.* [20]	Bakhshi, *et al.* [21]	Santonocito, *et al.* [22]	Polizzi, *et al.* [23]	Kakoei, *et al.* [24]	Georgaki, *et al.* [25]
		19	20	21	22	23	24	25
1	Was the study described as random? (Yes = 1, No = 0)	0	1	1	1	1	1	1
2	Was the randomization scheme described and appropriate? (Yes = 1, No =-1)	-1	1	1	1	1	1	1
3	Was the study described as double-blind? (Yes = 1, No = 0)	0	1	1	1	1	1	1
4	Was the method of double blinding appropriate? (Yes = 1, No =-1)	-1	1	1	1	1	1	1
5	Was there a description of dropouts and withdrawals? (Yes = 1, No = 0)	1	1	0	1	1	1	1
	Score	-1	5	4	5	5	5	5
	Article quality	Low range of quality	High range of quality	High range of quality	High range of quality	High range of quality	High range of quality	High range of quality

Table 2: Characteristics of reviewed articles

No.	Author	Country, year	Study design	Number of patients	Therapy	Duration of therapy	Result	Side effects	Scopus' index
1	Zaslansky [20]	Germany, 2017	RCT	43	15 patients = 0.2% morphine mouthwash 16 patients = morphine mouthwash 0.4% 12 patients = placebo mouthwash	7 d	There was no significant difference in lesion healing or pain reduction in patients from the three groups.	Dry mouth, burning in the mouth, nausea, fatigue	Q1
2	Bakhshi [21]	Iran, 2020	RCT	31	14 patients = 0.1% triamcinolone acetonide mouthwash and 1% nano curcumin gel 17 patients = 0.1% triamcinolone acetonide mouthwash and placebo gel	1 mo	2 w of therapy showed a significant improvement in both groups, but neither was completely cured. Higher healing rate with 1% nano curcumin gel	None	Q3
3	Santonocito [22]	Italy, 2020	RCT	40	20 patients = anti-inflammatory mouthwash (calcium hydroxide, hyaluronic acid, umbelliferone,	3 mo	Both groups showed significant improvement in signs and symptoms of the disease.	None	Q2

No.	Author	Country, year	Study design	Number of patients	Therapy	Duration of therapy	Result	Side effects	Scopus' index
					oligomeric pro-anthocyanidins)				
					20 patients = 0.05% oral clobetasol gel		The Clobetasol group showed more healing.	Mild side effects (not stated)	
4	Polizzi [23]	Italy, 2021	RCT	38	19 patients = anti-inflammatory mouthwash (10% calcium hydroxide, 0.3% hyaluronic acid, umbelliferone, oligomeric pro-anthocyanidins)	3 mo	Both therapies significantly reduce the signs and symptoms of the disease	None	Q1
					19 patients = 0.1% tacrolimus ointment		In the third month, fewer signs and symptoms of disease than in the mouthwash group	4 patients had mild side effects (burning mouth, change in taste sensation)	
5	Kakoei [24]	Iran, 2022	RCT	36	18 patients = henna mouthwash (2% henna solution, 2% ethanol, 10% glycerin, 0.1% methylparaben)	2 w	Both groups showed significant improvement in signs and symptoms of the disease.	None	Q2
					18 patients = 0.2% chlorhexidine gluconate mouthwash		The henna mouthwash group showed a better pain score and healing of lesions.		
6	Georgaki [25]	Italy, 2022	RCT	32	18 patients = dexamethasone mouthwash 2 mg/5 ml	1 mo	Both therapies significantly reduce the signs and symptoms of the disease	7 patients with candidiasis	Q1
					14 patients = cyclosporine mouthwash 100 mg/ml		Healing of lesions in the dexamethasone group was better Pain score reduction did not differ in the two groups.	3 patients with candidiasis	

Notes: RCT = Randomized controlled trial

Table 3: Comparison of decreasing ulcer size in OLP patients using mouthwash

No	Authors, Year	Mouthwashes	Duration of therapy																			Adverse Effects
			1st mo								2nd mo							3rd mo				
			Baseline 0	1st W Day 1	2	3	4	5	6	7	2nd W	3rd W	4th W	5th W	6th W	7th W	8th W	9th W	10th W	11th W	12th W	
1	Zaslansky (2017) [20]	Morphine 0.2%	0.8	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	dry mouth, burning sensation, nausea, fatigue
		morphine 0.4%	1.7	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	
2	Bakhshi (2020) [21]	Triamcinolone acetonide 1%																				none
		Complete healing	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-	-	-	-	
		Marked improvement	-	-	-	-	-	-	-	-	2	-	7	-	-	-	-	-	-	-	-	
		Moderate improvement	-	-	-	-	-	-	-	-	11	-	7	-	-	-	-	-	-	-	-	
		no improvement	-	-	-	-	-	-	-	-	1	-	0	-	-	-	-	-	-	-	-	
3	Santonocito (2020) [22]	anti-inflammatory mouthwash (calcium hydroxide, hyaluronic acid, umbelliferone, oligomeric pro-anthocyanidins)	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	none
4	Polizzi (2021) [23]	anti-inflammatory mouthwash (calcium hydroxide 10%, hyaluronic acid 0.3%, umbelliferone, and oligomeric pro-anthocyanidins)	1.84	-	-	-	-	-	-	-	-	-	1.74	-	-	-	1.58	-	-	-	1.53	none
5	Kakoei (2022) [24]	henna mouthwash (2% aqueous extract of henna, 2% ethanol, 10% glycerol, and 0.1% methylparaben distilled water)	3.9	-	-	-	-	-	-	3.3	3.2	-	-	-	-	-	-	-	-	-	-	none
		Chlorhexidine gluconate 0.2%	3.8	-	-	-	-	-	-	3.0	2.7	-	-	-	-	-	-	-	-	-	-	Candidiasis
6	Georgaki (2022) [25]	Dexamethasone 2 mg/5 ml	4.17	-	-	-	-	-	-	3.00	2.56	2.46	2.13	-	-	-	-	-	-	-		Candidiasis (7 of 18 patients)
		Cyclosporine 100 mg/ml	3.42	-	-	-	-	-	-	3.51	2.88	3.02	2.57	-	-	-	-	-	-	-		Candidiasis (3 of 14 patients)

Note: (-) = Not Mentioned

Table 4: Comparison of decreasing pain scores in OLP patients using mouthwash

No	Authors, Year	Mouthwashes	Duration of therapy																		Adverse effects
			1st mo								2nd mo							3rd mo			
			Baseline	1st W Day							2nd W	3rd W	4th W	5th W	6th W	7th W	8th W	9th W	10th W	11th W	12th W
			0	1	2	3	4	5	6	7											
1	Zaslansky (2017) [20]	morphine 0.2%	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	dry mouth, burning sensation, nausea, fatigue
		morphine 0.4%	3.5	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	
2	Bakhshi (2020) [21]	triamcinolone acetonide 1%	20.39	-	-	-	-	-	-	-	11.04	-	7.21	-	-	-	-	-	-	-	none
3	Santonocito (2020) [22]	anti-inflammatory mouthwash (calcium hydroxide, hyaluronic acid, umbelliferone, oligomeric pro-anthocyanidins)	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	none
4	Polizzi (2021) [23]	anti-inflammatory mouthwash (calcium hydroxide 10%, hyaluronic acid 0.3%, umbelliferone, and oligomeric pro-anthocyanidins)	3.89	-	-	-	-	-	-	-	-	-	3.37	-	-	-	2.74	-	-	2.37	none
5	Kakoei (2022) [24]	henna mouthwash (2% aqueous extract of henna, 2% ethanol, 10% glycerol, and 0.1% methylparaben distilled water)	5.5	-	-	-	-	-	-	4.5	3.7	-	-	-	-	-	-	-	-	-	none
		chlorhexidine gluconate 0.2%	4.5	-	-	-	-	-	-	3.5	3.0	-	-	-	-	-	-	-	-	-	
6	Georgaki (2022) [25]	dexamethasone 2 mg/5 ml	4.59	-	-	-	-	-	-	3.00	2.46	0.80	1.28	-	-	-	-	-	-	-	candidiasis (7 of 18 patients)
		cyclosporine 100 mg/ml	4.00	-	-	-	-	-	-	3.55	4.15	3.12	2.12	-	-	-	-	-	-	-	candidiasis (3 of 14 patients)

Note: (-) = Not Mentioned

DISCUSSION

OLP is a disease mediated by T-cells that can occur in the oral mucosa, but the predisposing factors are still unknown [26]. There are periods of remission in which the patient complains of no symptoms (reticular, papular, and plaque-like types) and periods of exacerbation (bullous, erythematous, and ulcerative types) in which the patient experiences severe pain or burning that may be related to stress, allergen exposure or drugs, trauma or immune deficiency [3]. The primary treatment for this condition is corticosteroids, but in long-term use, especially systemic corticosteroids can cause hypertension, diabetes, osteoporosis, weight gain, and muscle weakness, while topical preparations can cause burning pain, mucosal atrophy, and candidiasis [10]. Alternative medicine that is safe and effective in the long term continues to be studied because of its safety which has fewer side effects than synthetic materials [26]. Antimicrobial compounds have been studied for their health benefits, especially for the oral cavity [12]. These compounds are mainly derived from herbal extracts, metal salts, and phenolic compounds, which have shown good results in clinical and laboratory studies [27]. Research on herbal extracts was carried out because of their non-chemical, non-synthetic properties, and has long been used as traditional medicine [26]. Natural ingredients have been widely used in treating many diseases, including OLP, because it has anti-inflammatory, antioxidant, and antibacterial characteristics that have been found in herbs [28].

Table 1 shows the assessment of the risk of bias from 7 articles from articles searched on OLP treatment using herbal or synthetic mouthwashes. An assessment of the risk of bias was carried out, and one article was found as low quality, so it was not included as a study article. Six articles are researched on OLP treatment using mouthwash from several countries (Germany, Iran, and Italy), showing several herbal and synthetic ingredients (table 2). Herbal mouthwash made from morphine [20], concoction (anti-inflammatory mouthwash (calcium hydroxide, hyaluronic acid, umbelliferone, oligomeric proanthocyanidins) [22, 23], and henna [24], while synthetic mouthwash made from triamcinolone acetonide 0.1% [21], chlorhexidine gluconate 0.2% [24], dexamethasone 2 mg/5 ml, and cyclosporine 100 mg/ml [25]. Generally, the comparison of the healing rate with synthetic-based mouthwash shows better, but in some patient conditions, the use of this synthetic mouthwash cannot be given. These conditions include the presence of conditions of alcohol abuse/dependence, hypersensitivity to the components of mouthwash ingredients, patients with kidney, liver, respiratory, and digestive tract disorders, patients with a history of autoimmune diseases, sleep apnea, malignancy, HIV infection, patients who have undergone transplant procedures, pregnant or lactating, patients using orthodontic appliances and users of inappropriate prostheses [20-25].

The success of each therapy can be seen from the decrease in the size of the ulcer (table 3) and the decrease in pain scores (table 4) in patients undergoing therapy. Tables 3 and 4 show that synthetic mouthwash made from dexamethasone reduced the ulcer size by 38.6% and pain by 46.4% compared to other mouthwashes in 2 w. However, the therapy caused a side effect, candidiasis, in 7 of 18 patients. On the other hand, herbal mouthwash made from henna reduced ulcer size by 17.9% and pain by 32.7% in 2 w without causing side effects.

Zaslansky *et al.* (2017) conducted a study on the use of morphine in 43 asymptomatic OLP patients to determine its effect on healing, pain reduction, and safety. Morphine was given in mouthwash preparations with concentrations of 0.2%, 0.4%, and placebo. It was reported that there was no significant difference in lesion healing or pain reduction in patients from the three groups. The side effects found were dry mouth, burning sensation in the mouth, nausea, and fatigue [20].

Morphine is a natural opium alkaloid used to treat acute and chronic moderate to severe pain [29]. Opioids bind to specific proteins (opioid receptors in the central nervous and peripheral nervous systems) that are widely distributed and involved in modulation. In addition, endogenous opioid peptides (endorphins) in pain modulation also bind to these receptors [30]. The study of Zaslansky *et al.* showed that the healing process in all patients progressed at the same rate and reported a similar reduction in pain; the condition can occur due to the natural course of the disease or the effect of the properties of glycerin [20].

Bakhshi *et al.* (2020) studied OLP patients treated with 0.1% triamcinolone acetonide mouthwash and 1% nano-curcumin gel [21]. Corticosteroids are the first-choice therapy in the treatment of OLP [4]. Triamcinolone acetonide is a moderate to potent corticosteroid often used to treat mucosal lesions. However, some patients may require long-term use or replacement with stronger steroids if lesions are resistant to these drugs. The use of triamcinolone acetonide in combination with herbal medicine can increase its efficacy in the treatment of OLP lesions [21]. One of the herbs often used is turmeric, with curcumin as its effective substance, a polyphenol with potent antioxidant properties such as vitamin C and vitamin E [31, 32]. Curcumin has many pharmacological properties, including antioxidant, anti-inflammatory, antimicrobial, and anticancer properties, with good efficacy in treating OLP [33, 34]. Based on the research of Bakhshi *et al.*, it was found that the healing rate of OLP lesions in patients receiving combination therapy with triamcinolone acetonide 0.1% mouthwash and 1% nano curcumin gel was higher than the placebo gel combination [21].

There were two studies conducted on anti-inflammatory mouthwash consisting of calcium hydroxide, hyaluronic acid, umbelliferone, and oligomeric pro-anthocyanidins compared with 0.05% oral clobetasol gel (Santonocito *et al.*, 2020) [22] and 0.1% tacrolimus ointment (Polizzi *et al.*, 2021) [23]. The studies show that each therapy significantly reduces the signs and symptoms of OLP, with a higher healing rate in the clobetasol and tacrolimus groups, but patients complained of side effects. Clobetasol belongs to the class of corticosteroids whose topical preparations can cause side effects such as candidiasis, burning sensation, mucosal atrophy, nausea, and mouth and throat pain. Tacrolimus is a calcineurin inhibitor used in treating OLP but is less effective than the corticosteroid group. These side effects include a burning sensation in the mouth and a change in taste sensation, whereas, in the anti-inflammatory group, there were no side effects [22, 23].

Calcium hydroxide, introduced in dentistry in 1921, has biocompatible and antimicrobial properties. This antimicrobial activity is obtained from the release of hydroxyl ions which are free radicals that are very antioxidant [35]. Hyaluronic acid (HA) is a natural nonsulfated glycosaminoglycan, a linear polysaccharide of the extracellular matrix of connective tissue, synovial fluid, embryonic mesenchyme, vitreous humor, skin, organs and body tissues. HA is a component of the gingival tissue, periodontal ligament, and complex tissues. The substance also has a significant role in the wound-healing process. Therefore, HA continues to be developed and applied, especially as a treatment for inflammation [36].

Umbelliferone (UMB) is a coumarin found in the plant. The Umbelliferae family includes herbs such as celery, cumin, fennel, and parsley. Phenolic coumarins derived from plants act as antioxidants because of their properties and can be consumed as food in fruits and vegetables. UMB has also been reported to have antioxidant properties. UMB is a 7-hydroxycoumarin which is a pharmacologically active agent [37]. Pro-anthocyanidins are a large class of polyphenols called flavanols, which are complex polyphenols such as tannins obtained naturally from plant metabolites such as fruits (cranberries, grapes), vegetables, seeds, specific pine bark, and hawthorn. Pro-anthocyanidins have various properties that are beneficial to health [38]. Research shows that pro-anthocyanidins can protect the body and provide vision improvement and flexibility in joints, arteries, and body organs such as the heart. Proanthocyanidin oligomeric complexes (OPCs) have antioxidant, antibacterial, antiviral, and anti-inflammatory properties [39].

Kakoei *et al.* (2022) conducted a study on 36 OLP patients, and each group consisted of 18 people who were treated with henna mouthwash (2% henna solution, 2% ethanol, 10% glycerin, and 0.1% methylparaben) and chlorhexidine gluconate 0.2%. This study reported that both therapy types significantly reduced the disease's signs and symptoms without the side effects of treatment. The henna group showed better lesions healing and reduced pain [24].

Henna (*Lawsonia inermis* L.) has been a cosmetic and medicine for more than 9.000 y. Henna, a tropical plant from Africa and Asia, has small leaves and white flowers. Parts of this plant are also used in traditional medicine because of its anti-inflammatory, antiviral, antioxidant, and antipyretic properties. This plant has been used in traditional medicine for various diseases such as heart disease, diabetes, diarrhea, fever, headache, and rheumatoid arthritis. Several studies have shown its ability to inhibit the growth of bacteria and fungi and have a local analgesic effect. Several substances found in henna include protein, flavonoids, phenolic compounds, and fatty acids. It's core chemical components are 2-hydroxynaphthoquinones (lawsone), mannite, tannic acid, mucilage, and gallic acid [40].

Chlorhexidine is a broad-spectrum bisbiguanide antiseptic that was first used as an antiseptic cream**.** Chlorhexidine digluconate is a water-soluble salt of chlorhexidine and is often used in clinical medicine. In dentistry, chlorhexidine is used in various preparations, such as mouthwashes, gels, sprays, and varnishes. Chlorhexidine mouthwash is available in concentrations of 0.1%, 0.12%, and 0.2% chlorhexidine digluconate [41]. In addition to its role as an antiseptic, chlorhexidine also has side effects. The side effects include discoloration of teeth, creating a burning sensation in the mouth, and resulting in loss of taste [42].

Georgaki *et al.* (2022) studied the use of mouthwash made from dexamethasone and cyclosporine. In the dexamethasone group, 18 people used dexamethasone 2 mg/5 ml mouthwash, while the cyclosporine group used 100 mg/ml cyclosporine mouthwash. Both therapies significantly reduced the signs and symptoms of the disease, although the healing of lesions in the dexamethasone group was better than in the cyclosporine group. The decrease in pain in both groups also showed the same results. In addition to the success of the therapy, there was a side effect, namely, candidiasis, found in both groups in seven people from the dexamethasone group and three from the cyclosporine group [25].

Dexamethasone is a fat-soluble corticosteroid, but its use has side effects, such as candidiasis, so antifungal treatment is needed [43]. Cyclosporine A (CsA) is one of the immunosuppressive drugs used in the prevention of organ transplant rejection as well as in immune diseases (Behçet's disease, rheumatoid arthritis, and systemic lupus erythematosus). Side effects of using CsA include gingival overgrowth (GO), nephrotoxicity, hepatotoxicity, and bone loss [44]. Topical cyclosporine in solution form is rarely prescribed because of its high cost, the possibility of systemic absorption, and carcinogenic potential. Most studies do not show that these drugs are more effective than topical corticosteroids [43].

The use of mouthwash is preferred because it is easy to apply in the oral cavity, especially in areas that are difficult to reach. This review presents research on synthetic and herbal mouthwashes for OLP therapy. Corticosteroids are synthetic materials used as the main therapy in treating OLP, showing more significant results in reducing ulcer size and pain, but can cause side effects, namely candidiasis [25]. Dexamethasone is the most prescribed mouthwash because it reduces pain and lesion size. However, patients often complain of side effects such as dry mouth, facial swelling, nausea, and weight gain [45]. Different things are seen in the use of henna as herbal mouthwash that has several abilities, such as anti-inflammatory and antibacterial, which can also reduce ulcer size and pain in OLP patients without causing side effects [24]. Henna (Lawsonia inermis L.) is a plant used in cosmetics and medicine. This herb has significant anti-inflammatory, analgesic, and antipyretic properties [46].

CONCLUSION

A synthetic mouthwash made from corticosteroids is the most effective OLP therapy in reducing ulcer size and pain compared to

mouthwash made from herbal. However, in addition to its effectiveness, synthetic mouthwash also has side effects. Different things are shown in the use of herbal mouthwashes. Although its efficacy is not comparable to synthetic mouthwash, it has fewer side effects, so further research on herbal ingredients as a treatment for lichen planus is needed.

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AUTHORS CONTRIBUTIONS

All authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

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