Mouthwashes used in patients with oral and oropharyngeal mucositis: A systematic review

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Abstract

Purpose

The aim of this study was to conduct a systematic review of randomized clinical trials in order to assess the efficacy of the following mouthwashes recommended for the prevention and treatment of OM and OPM in patients undergoing cancer treatment: chlorhexidine, allopurinol, benzydamine, and propolis.

Methods

The following research question was formulated based on the PICOS strategy: “Are chlorhexidine, allopurinol, benzydamine and propolis mouthwashes effective in preventing and treating OM and OPM in patients undergoing cancer treatment?” Searches were performed in PubMed, Embase, Scopus, and Web of Science, without publication year or language restrictions. Randomized clinical trials comparing the use of chlorhexidine, allopurinol, benzydamine and propolis with a control group not submitted to any intervention were included. The retrieved articles were analyzed and selected by two reviewers and disagreements were resolved by consultation with a third reviewer. After data extraction, two evaluators independently analyzed the methodological quality of the studies using the Cochrane tool.

Results

After evaluation of the works, 13 of 1183 articles were selected. mouthwashes containing propolis and benzydamine mouthwashes were promising and effective while chlorhexidine or allopurinol did not provide satisfactory results.

Conclusion

Mouthwashes could be an alternative for treatment or preventing oral mucositis in cancer patients Services could consider the possibility of incorporating these medications since, in most cases, they are low cost and donot require specialized staff in their use.

INTRODUCTION

Antineoplastic treatment can compromise the patient's quality of life and nutritional status, in addition to being a limiting factor in the progression of chemotherapy and radiotherapy [1, 2, 3, 4, 5]. Oral mucositis (OM) and oropharyngeal mucositis (OPM) are common acute complications in patients undergoing antineoplastic therapy characterized by painful symptoms [6–8].

Diverse resident microorganisms are found in the oral cavity and oral lesions can therefore predispose patients to local and systemic infections, worsening their clinical condition [9, 10, 11, 12, 13, 14]. Furthermore, OPM is frequently associated with pain, dysphagia, dehydration, micronutrient deficiencies, and weight loss [15, 16, 17, 18].

The prevention and treatment of antineoplastic therapy-induced OM and OPM have been extensively discussed in the literature. Some studies have investigated measures to reduce the severity of these conditions and possible complications; however, there seems to be no consensus regarding a specific protocol to be adopted. Among the methods investigated, photobiomodulation has shown good results in the management of OM [19, 20, 21, 22, 23]. However, photobiomodulation requires specialized personnel and equipment and cannot be performed by the patients themselves. Thus, there is a need for new therapies that not only promote symptom relief but also act as a therapeutic alternative. Such therapies are expected to promote the re-epithelialization of tissue lesions and to have a pleasant taste and low toxicity [24, 25, 26, 27, 28]. In addition, they can be used safely by the patient and are affordable for most of the population [29.29,30,31,32,33].

In view of the adverse effects of traditional drugs, increasing attention has been given to a range of natural agents because of their anti-inflammatory, antibacterial, antioxidant, immunomodulatory, sedative, and healing activities. These agents may be effective in the prevention and treatment of OM and OPM [34.35,36,37].

The aim of this systematic review was to evaluate the efficacy of chlorhexidine, allopurinol, benzydamine, and propolis mouthwashes in the prevention and treatment of OM and OPM in patients undergoing cancer treatment, as these substances are easily accessible, inexpensive, and do not require specialized technical personnel for daily use and can therefore be easily incorporated by health services.

MATERIAL AND METHODS

Study design

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [38], and the protocol was registered on the Open Science Framework (OSF) (https://osf.io/).

Research question

The following research question was formulated based on the PICOS strategy (Table 1): “Are chlorhexidine, allopurinol, benzydamine and propolis mouthwashes effective in preventing and treating OM and OPM in patients undergoing cancer treatment?”

Table 1
Description of the PICOS strategy for formulation of the research question

Acronym	Definition	Description
P	Patients	Patients undergoing cancer treatment
I	Intervention	Use of chlorhexidine, allopurinol, benzydamine, and propolis
C	Comparison	Other type of mouthwash; no treatment
O	Outcome	Efficacy in the prevention or treatment of oral and oropharyngeal mucositis
S	Study design	Randomized clinical trial

Search strategy

Searches were performed in the databases described in Table 2 on 30 October 2023 and updated on 30 January 2024. In addition, the reference list of the included articles was hand searched to identify any references that may have been missed during the electronic database search. The retrieved references were exported to Endnote Online (Clarivate Analytics, London, UK). Duplicates were removed.

Table 2
Search strategy

Database	Keywords used in the search strategy
PubMed Embase Scopus Web of Science OpenGrey Google Scholar	(mouthwash OR mouthwashes) AND (stomatitides OR stomatitis OR “oral mucositis” OR “oral mucositides” OR “oromucositides”)

Inclusion criteria

The inclusion criteria were randomized clinical trials that evaluated the use of mouthwashes containing chlorhexidine, allopurinol, benzydamine and propolis for the prevention or treatment of OM or OPM.

Exclusion criteria

Clinical trials without a control group, studies in which patients had undergone previous interventions, studies in which patients rinsed the mouth and swallowed the mouthwash, *in vitro* studies, and animal studies were excluded.

Study selection and data extraction

Two reviewers analyzed and selected each article. In the case of disagreement, a third reviewer was consulted. Article selection was conducted in two steps. First, all titles/abstracts of the records retrieved in the electronic search were evaluated. Records whose title/abstract met the eligibility criteria were directly included in this systematic review. In the case of records whose titles/abstracts

contained insufficient information for a decision, the full text was retrieved and evaluated independently by the same two authors in the second step. Records whose full text met the eligibility criteria were also included.

Risk of bias in individual studies

Risk of bias assessment was performed independently by two authors using the Cochrane tool [39]. Disagreements were resolved by a third evaluator. The following items were assessed: random sequence generation, allocation concealment, blinding of participants/personnel, blinding of outcome assessors, incomplete data, selective reporting, and other sources of bias.

RESULTS

Study selection

The searches retrieved 1,183 articles. After the removal of duplicate articles, 995 titles/abstracts were evaluated in the first step and 431 records were excluded. The methodology was evaluated in the remaining 564 articles. Screening of titles/abstracts based on the eligibility criteria resulted in the selection of 23 articles for full-text reading. Thirteen of these articles met the eligibility criteria and were included in this systematic review (Fig. 1). The studies are described in chronological order in Table 3.

Characteristics of the included studies

All studies were published in English and were conducted in eight different countries. The largest number of studies was from Iran (n = 4), followed by India (n = 2). The other countries, including the United States, South Korea, Papua New Guinea, Iraq, Thailand, and Brazil, contributed one study each (n = 6).

The total sample of this review consisted of 629 patients who used the mouthwashes evaluated in the included studies. Chlorhexidine was analyzed in five studies (total sample of 230 patients), allopurinol in four (214 patients), benzydamine in three (230 patients), and propolis in one study (40 patients).

The sample size of the studies ranged from 83 participants in the largest group analyzed to 23 participants in the smallest group.

Table 3
Studies described in chronological order

Author and country	Years	Comparison groups and objective	Initial and final sample	Treatment	Diagnosis	Variables analyzed	Results of comparisons
Loprinzi et al. [40] United State	1990	TG: allopurinol CG: placebo Prevention	77 (77)	Chemotherapy: 5-FU and Leucovorin	Colorectal cancer	OM degree evaluated using two methods: 1) physician judgment of mucositis severity, graded from 0 to 4 according to NCCTG toxicity guidelines; 2) patient questionnaires to rate their own degree of mucositis	There was no significant difference in OM degrees between TG and CG: mean physician-judged toxicity grade was 1.8 for TG and 1.3 for CG ($p = 0.07$); mean patient-graded toxicity was 1.9 for TG and 1.5 for CG ($p = 0.15$).
Abbasi Nazari et al. [41] Iran	2007	TG: allopurinol CG: placebo Prevention and treatment	24 (24)	Radiotherapy	Oral, nasopharyngeal or hypopharyngeal cancer	OM degree (WHO) in the first, second, third, fourth, fifth, and sixth week of radiotherapy	There was no significant difference in mucositis severity between TG and CG in the first or second week ($p = 0.227$ and $p = 0.121$, respectively). TG had lower scores in the third, fourth, fifth and sixth week of treatment ($p < 0.05$ for each week).
Madan et al. [42] India	2008	Three TG: 1) 0.12% chlorhexidine 2) 1% povidone-iodine 3) salt/sodium bicarbonate CG: Plain water Prevention and treatment	80(76)	Radiotherapy	Malignant head and neck neoplasms	OM degree (WHO) was assessed at baseline and at weekly intervals during radiation therapy for 6 weeks	TG: significant difference between the povidone-iodine group and all other groups No statistically significant difference in mean mucositis scores between TG and CG
Shabanloel et al. [43] Iran	2009	Two TG: 1) allopurinol 2) chamomile CG: normal saline Prevention	83 (83)	Chemotherapy	Different malignant diseases	OM degree (WHO) for 16 days and self-reporting tools to evaluate pain	No significant difference in the variability or total intensity of stomatitis was found between the allopurinol and chamomile groups from the first to the fourth time. Stomatitis pain intensity differed

Author and country	Years	Comparison groups and objective	Initial and final sample	Treatment	Diagnosis	Variables analyzed	Results of comparisons
							significantly in the allopurinol group compared to the normal saline group.
Panahi et al. [44] Iran	2010	TG: allopurinol CG: placebo Prevention	33 (30)	Chemotherapy with 5-FU	Different malignant diseases	OM degree (WHO) on days 1, 3 and 7 after chemotherapy.	The results did not show a significant difference in the occurrence ($p = 0.256$) or severity ($p = 0.386$) of mucositis between the two groups.
Mehdipour et al. [45] Iran	2011	TG: 0.2% zinc sulfate CG: 0.2% chlorhexidine gluconate Prevention and treatment	30 (30)	Chemotherapy	Acute leukemia	Spijkervet Scale to grade oral mucositis every week for 8 weeks	There was no significant difference between groups in the first week of treatment ($p = 0.124$). The trend of changes in the OM index assessed during the study was similar in both groups; however, a significant difference was observed in weeks 2 and 3 ($p = 0.025$), with OM being less severe in patients using zinc sulfate, suggesting efficacy of the product
Choi and Kim [46] South Korea	2012	TG: chlorhexidine (CHX) CG: Sodium bicarbonate (SB) Prevention and treatment	68 (48)	Chemotherapy	Acute leukemia	OM degree (WHO) every day from the day chemotherapy started to the 28th day or to the day of discharge from the hospital	No significant differences were noted in the incidence rates of oral mucositis between the two groups. However, the incidence rate of ulcerative oral mucositis was significantly lower in the SB group (25.0%) than in the CHX group (62.5%, $p = 0.008$). The mean number of days to the onset of oral mucositis after chemotherapy was 13 days in

Author and country	Years	Comparison groups and objective	Initial and final sample	Treatment	Diagnosis	Variables analyzed	Results of comparisons
							both groups. The onset of ulcerative mucositis was significantly later in the SB group (16.1 days) than in the CHX group (11.4 days, p = 0.013). In this study, the mean duration of oral mucositis was 12 days in both groups. No significant differences were observed in the mean duration of oral mucositis between the SB group (11.8 days) and CHX group (13.7 days).
Ahmed [47] Iraq	2013	TG: benzydamine, olive leaf extract (OLE) CG: placebo Prevention	40 (25)	Chemotherapy	Acute myeloid leukemia and lymphoblastic leukemia	OMAS and WHO scales on days 1, 8, and 15	The lowest mean OMAS scores were recorded in the OLE group, followed by the benzydamine and placebo groups, respectively. Changes in the OMAS scores were highly significant (p < 0.01). The mean OMAS scores were low on day 1 (first day after receiving chemotherapy). On days 8 and 15, the mean OMAS scores increased significantly in the placebo group compared to the OLE and benzydamine groups. According to the WHO oral mucositis grades, the OLE group showed no grade 3 or 4 and grades 2, 3, and 4 were more common in the placebo group compared to the

Author and country	Years	Comparison groups and objective	Initial and final sample	Treatment	Diagnosis	Variables analyzed	Results of comparisons
							benzydamine group.
Akhavan-Karbassi et al. [48] Iran	2016	TG: propolis CG: placebo (sterile water) Treatment and prevention	40 (40)	Chemotherapy with different chemotherapeutic agents	Head and neck neoplasms	OM degree (WHO) at baseline and on days 3 and 7	In the placebo and propolis groups, mucositis grades were significantly lower on day 7, while on day 3, a significant difference was only observed in the propolis group. There were significant differences in oral mucositis between the propolis and placebo groups ($p = 0.007$).
Gupta et al. [49] India	2018	TG: benzydamine (0.15%) CG: “candid b lotion (30 ml), cotrimazole (1% w/v), beclomethasone dipropionate (0.025% w/v), tetracycline (500 mg) and glycerin (30 ml). Treatment	60 (60)	Radiotherapy	Head and neck cancer	OM degree (WHO) every week for 2 weeks after the completion of radiotherapy	No significant difference between the two groups.
Chitapanarux *et al.* [50] Thailand	2018	TG: benzydamine hydrochloride (0.15%) CG: sodium bicarbonate (0.15%) Prevention	60 (60)	Radiotherapy and platinum-based chemotherapy	Head and neck cancer	OMAS scale, evaluated weekly during and at the end of radiotherapy	The median OMAS scores were significantly lower in the study group every week between the second and eighth week of cancer treatment. The corresponding p values for these weeks in chronological order were 0.003, < 0.001, < 0.001, < 0.001, < 0.001, 0.01, and 0.04. The maximum OMAS score across the whole period in the benzydamine group was 25, substantially lower than the maximum score of 37 in

Author and country	Years	Comparison groups and objective	Initial and final sample	Treatment	Diagnosis	Variables analyzed	Results of comparisons
							the sodium bicarbonate group.
Afrasiabifar et al. [51] Iran	2020	TG: combined solution of grape vinegar and rose water CG: chlorhexidine Treatment	60 (53)	Chemotherapy (any drug)	Carcinomas, adenocarcinomas and others	OM degree (WHO) at baseline and on days 7, 14, and 21	Comparison between groups using Fisher's exact test showed no significant differences in the number of patients with treated oral mucositis in either group ($p > 0.05$). The changes in chemotherapy-induced disease severity after the use of the combined solution of grape vinegar and rose water were similar to those observed for chlorhexidine.
Santaella et al. [52] Brazil	2020	TG: polyhexanide (0.2%) (Prosept®) CG: chlorhexidine Prevention and treatment	40 (23)	Chemotherapy (any drug) Radiotherapy plus chemotherapy	Different neoplasms	OM degree (WHO) evaluated in three stages: immediately before starting radiotherapy and/or chemotherapy sessions; during antineoplastic treatment (radiotherapy: after 15 to 20 sessions; chemotherapy: after 5 to 7 days), and after the end of the antineoplastic treatment cycle	There was no significant difference between groups in the assessments regarding the development of mucositis.

TG: treatment group; CG: control group; 5-FU: 5-fluorouracil; OM: oral mucositis; NCCTG: North Central Cancer Treatment Group; WHO: World Health Organization; OMAS: Oral Mucositis Assessment Scale.

Nine studies evaluated chemotherapy-induced mucositis, three studies analyzed radiotherapy-induced mucositis, and the patients underwent both treatments in one study.

Five of the included studies aimed to evaluate interventions for mucositis prevention alone. Another five studies aimed to examine the prevention and treatment of OM, and only three studies the treatment of OM. Among the interventions for prevention, four studies did not report results that would permit to consider the interventions effective. In two studies, the interventions used for treatment proved to be effective. Among the studies that evaluated interventions for simultaneous prevention and treatment, four reported effective interventions for prevention and treatment and one effective interventions for treatment.

Regarding the agents used as controls, five studies used placebo. The remaining eight studies used the following products as control: povidone-iodine, sodium bicarbonate, chamomile, normal saline, zinc sulfate, olive leaf extract, magic mouthwash, combined solution of grape vinegar and rose water, and polyhexanide.

The severity of OM was assessed using scales that measure the degree of this condition based on specific characteristics. The WHO mucositis grading scale was the most frequently employed instrument, used in 11 of the studies included in the systematic review. Only one study [45] used the Spijkervet Scale for OM grading and another study [40] graded OM using the NCCTG toxicity guidelines, and a questionnaire completed by the patients to rate their own symptoms.

Risk of bias assessment

The high heterogeneity among studies did not allow to perform a meta-analysis; thus, qualitative analysis was carried out (Table 4). Regarding random sequence generation and allocation concealment, all studies had a low risk of bias. Two articles had a low risk regarding blinding of participants/personnel and the others had a high risk of bias. Regarding blinding of outcome assessors and incomplete data (losses), nine studies had a low risk of bias and four a high risk. Regarding selective reporting, there was a low risk of bias in seven studies and a high risk in six. Finally, we observed that all studies had a high risk of bias regarding other sources of bias.

Table 4
Assessment of risk of bias in the clinical trials

	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete data (losses)	Selective reporting	Other sources of bias
Loprinzi et al., 1990 [40]	Low risk	Low risk	Low risk	Low risk	Low risk	High risk	High risk
Abbasi Nazari et al., 2007 [41]	Low risk	Low risk	Low risk	High risk	High risk	Low risk	High risk
Madan et al., 2008 [42]	Low risk	Low risk	High risk	Low risk	High risk	High risk	High risk
Shabanloei et al., 2009 [43]	Low risk	Low risk	High risk	High risk	Low risk	High risk	High risk
Panahi et al., 2010 [44]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Gupta et al., 2018 [49]	Low risk	Low risk	High risk	Low risk	Low risk	High risk	High risk
Mehdipour et al., 2011 [45]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Choi and Kim, 2012 [46]	Low risk	Low risk	High risk	Low risk	Low risk	High risk	High risk
Ahmed, 2013 [47]	Low risk	Low risk	High risk	High risk	High risk	Low risk	High risk
Akhavan-Karbassi et al., 2016 [48]	Low risk	Low risk	High risk	High risk	Low risk	Low risk	High risk
Chitapanarux et al., 2018 [50]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk
Afrasiabifar et al., 2020 [51]	Low risk	Low risk	High risk	Low risk	High risk	High risk	High risk
Santaella et al., 2020 [52]	Low risk	Low risk	High risk	Low risk	Low risk	Low risk	High risk

Source: The authors (2024)

DISCUSSION

The variable number of studies indicates the level of difficulty, complexity, great demand for time, and need for knowledge, among other factors, that are necessary for the successful design of studies.

In the studies analyzed, propolis and benzydamine hydrochloride mouthwashes were effective in reducing OM and OPM, while allopurinol mouthwash with did not show significant results. It is important to note that each patient is unique and may respond differently to treatment. Thus, further studies are needed to develop definitive protocols for the management of OM and OPM in cancer patients.

Allopurinol is a drug commonly used to treat gout, a condition characterized by painful episodes of inflammation in different joints as a result of excess uric acid in the body [21, 53, 54]. The drug acts by inhibiting xanthine oxidase, an enzyme that plays a crucial role in the production of uric acid, causing a decrease in uric acid levels in blood and the consequent relief of pain and inflammation [55].

Allopurinol was evaluated in four articles; three of these studies analyzed patients undergoing chemotherapy and one study evaluated patients undergoing radiotherapy. The randomized, double-blind, placebo-controlled clinical trial [41] investigating patients submitted to radiotherapy found no differences in the severity of OM between the group treated with allopurinol and the control group over the first 2 weeks of treatment. However, there were significant differences between groups from weeks 3 to 6, with significant improvement of mucositis in the allopurinol group. In contrast, the other studies involving patients submitted to chemotherapy found no significant difference between the group that used allopurinol and the other compounds analyzed [21, 53].

Benzydamine is a local analgesic and anti-inflammatory agent that is used to treat a variety of painful and inflammatory conditions, particularly those affecting the mouth and throat. The mechanism of action of benzydamine consists of the inhibition of prostaglandin synthesis, contributing to the reduction in pain and swelling (anti-inflammatory and analgesic) [54, 56].

Three studies evaluated the activity of benzydamine, two including patients undergoing chemotherapy and one including patients undergoing radiotherapy. Only one study [50] found benzydamine hydrochloride to be superior in the prevention and treatment of OM in patients undergoing chemotherapy.

Chlorhexidine is a potent antiseptic agent that acts against a broad spectrum of bacteria, both gram-positive and gram-negative. The compound is often incorporated in oral health products because of its effectiveness in reducing plaque formation and in treating gingivitis [57]. Due to its bactericidal and bacteriostatic activity, chlorhexidine is frequently used in hospital environments for skin disinfection before surgical procedures [58, 59].

Chlorhexidine is the most widely used and recommended mouthwash for patients undergoing cancer treatment because of its bactericidal, fungicidal, and virucidal properties. Six studies analyzed chlorhexidine; of these, one study investigated patients undergoing radiotherapy, one study examined patients undergoing chemotherapy and radiotherapy, and four studies investigated patients undergoing chemotherapy. However, chlorhexidine was not superior in any of these studies when compared to other compounds [60, 61, 62]. It is important to note that one study [46] comparing the efficacy of sodium bicarbonate solution and chlorhexidine in the oral care of patients during induction chemotherapy found the former to be more effective than chlorhexidine mouthwash, reinforcing that the indication of mouthwashes must be well assessed by the patient's care team.

Propolis is a resin collected by bees from different plants to protect the hive. This resin has antimicrobial, anti-inflammatory, antioxidant, and anticarcinogenic properties; it is therefore a product with different therapeutic applications [63, 64, 65]. The history of propolis use extends into traditional medicine, where it is used to boost immunity and to treat different infections and inflammatory conditions.

Only one study evaluated the effectiveness of propolis [48] and found that it reduced chemotherapy-induced OM. The results showed that the use of propolis as a mouthwash was effective in reducing OM and in improving the oral health of patients.

The methods used in the studies varied widely in terms of study design, active ingredients in the mouthwashes, and substances used for comparison. It is important to note that most studies observed a reduction in OM in patients with different types of cancer despite the wide variety of chemotherapy drugs and doses administered. In some studies, the authors included patients with diverse diseases that required different antineoplastic treatments, a fact that may interfere with the development and severity of OM and OPM (Table 5).

Table 5
Efficacy of medications in the studies analyzed

	Benzydamine (3 articles)	
Chemotherapy (2)	Chitapanarux et al. [50] Ahmed [47]	Showed efficacy
Radiotherapy (1)	Gupta et al. [49]	Showed efficacy – no severe mucositis
	Propolis (1 article)	
Chemotherapy (1)	Akhaven-Karbassi et al. [48]	Showed efficacy
	Chlorhexidine (5 articles)	
Chemotherapy (3)	Afrasiabifar et al. [51] Mehdipour et al. [45] Choi and Kim [46]	Did not show efficacy
Radiotherapy (1)	Madan et al. [42] Santaella et al. [52]	Did not show efficacy
Chemotherapy and radiotherapy (1)	Gupta et al. [49]	Did not show efficacy
	Allopurinol (4 articles)	
Chemotherapy (3)	Loprinzi et al. [40] Shabanloei et al. [43] Panahi et al. [44]	Did not show efficacy
Radiotherapy (1)	Abassi-Nazari et al. [41]	Efficacy after 3 weeks
Source: The authors (2024)		

Benzydamine was shown to be superior to sodium bicarbonate in preventing chemo/radiotherapy-induced OM [50]. On the other hand, sodium bicarbonate mouthwash was more effective than chlorhexidine in the oral care of patients with acute leukemia during induction chemotherapy [46].

The diversity of interventions explored reflects the complexity of mucositis and highlights the importance of multifaceted approaches to the treatment and prevention of OM in cancer patients. Regarding the results obtained, most studies provided qualitative data on the improvement of OM with the use of mouthwashes. However, the lack of standardization impairs the direct comparison of studies and the determination of the relative efficacy of mouthwashes. It is noteworthy that the studies evaluated did not identify important adverse effects of the interventions implemented for the prevention or treatment of OM and OPM.

Regarding limitations, all studies provided incomplete information, including a lack of details about randomization, possible conflicts of interest, and a clear description of the study design. These limitations can affect the interpretation of the results and the risk of bias in the studies. There is also the possibility that studies reporting negative results, especially small ones, have not been published.

The studies provided valuable information on different strategies to prevent and treat OM in cancer patients and thus contribute to the development of more effective approaches using the substances described that can improve the quality of life of patients undergoing antineoplastic treatment. These substances are easily accessible at public or private hospitals and do not require the recruitment of additional technical staff for their use.

Limitations must be considered when interpreting and comparing the results of the studies. Further studies with a robust design that provide more detailed information about the results are needed to obtain stronger scientific evidence.

Conclusion

Mouthwashes containing chlorhexidine or allopurinol were not effective in preventing and treating OM. Benzydamine and propolis show promising results in the prevention and treatment of OM in patients undergoing cancer treatment. The use of benzydamine and propolis can contribute to improving the patient's quality of life and to reducing the negative impacts of mucositis during antineoplastic treatment. Services should consider the possibility of incorporating these medications since, in most cases, they are low cost and do not require specialized staff in their use.

Some studies did not find significant differences between intervention groups, indicating the complexity of OM and the need of multifaceted assessment for its management. The complexity of this condition and the diversity of studies highlight the importance of further comprehensive and standardized investigations to provide more consistent evidence and to support clinical decisions. There is continued need to improve mucositis prevention and treatment strategies, including the development of personalized and effective approaches to improve the well-being of cancer patients.

Declarations

Author Contribution

Fernanda Pereira Delgado Costa and Maria Luisa Leandro de Souza Dias participated in the data collection, literature review, methodology, analysis and discussion of the data and drafting the article.Karla Emília Rodrigues participated in the analysis and discussion of data, drafting and correction of the article.Lucas Guimarães Abreu participated Study conception and design , acquisition of data , drafting of manuscript and correction of the article.Tarcília Aparecida Silva and Denise Vieira Travassos devised directed and coordinated the study, participated in the analysis and discussion of data, drafting and correcting the article.All authors critically revised the manuscript, approved the final version to be published, and agree to be accountable for all aspects of the work.

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Figures

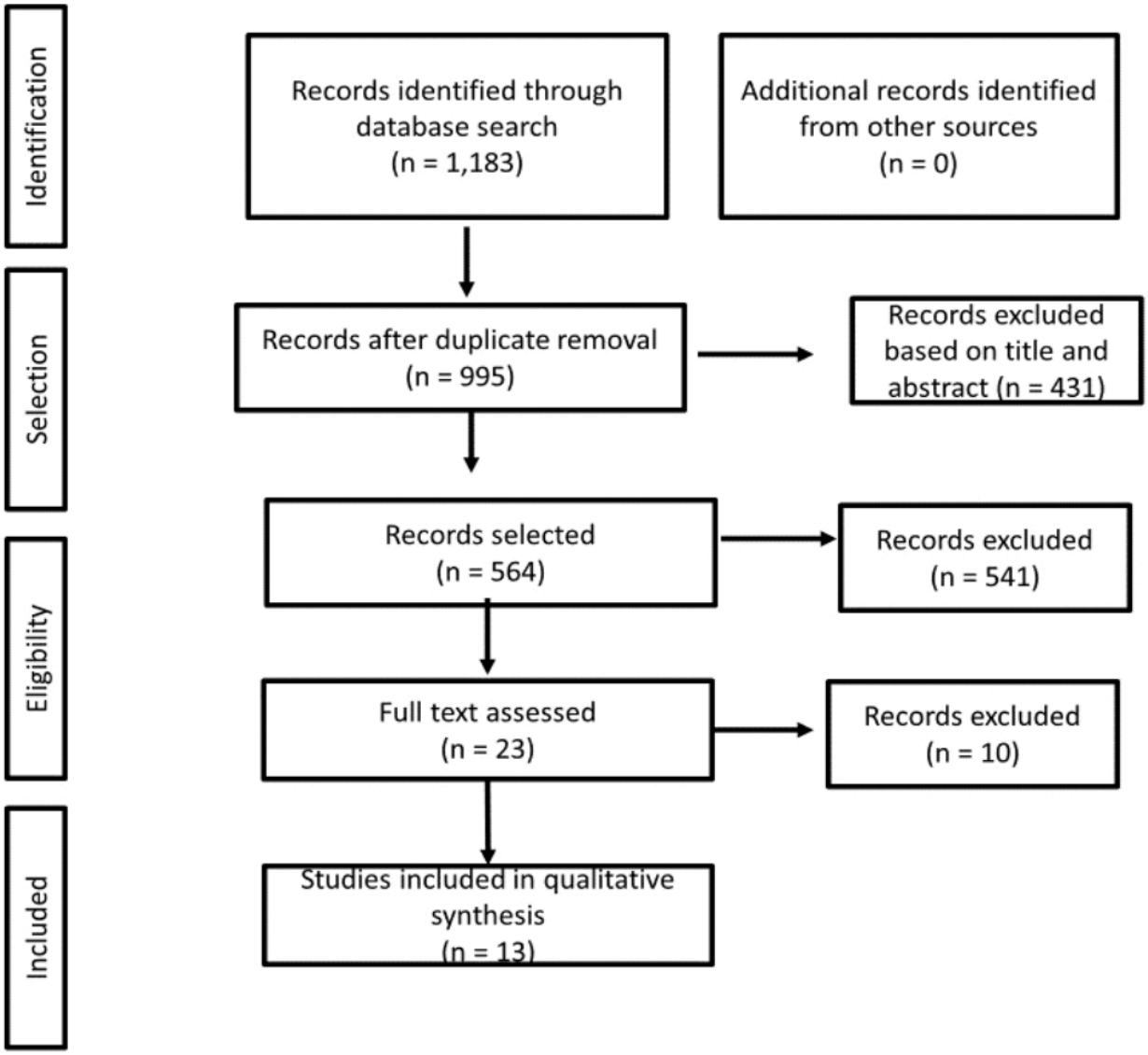

Figure 1

PRISMA flow diagram of the article selection process.

Source: The authors (2024)