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Review Article

A Literature Review Of Regarding The Use Of Herbal Medicines In Pediatric Dentistry

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ABSTRACT

Writing this review aims to review herbal medicines used in Pediatric Dentistry (IKGA) on how to use herbal ingredients in the dental care of children, the benefits of the herbal ingredients themselves, and their effectiveness in caring for children's teeth. A comprehensive and systematic search was carried out on PubMed and the Google Scholar database for works published from January 1999 to 2020, using the following terms in the search: pediatric dentistry and herbal medicines. Additional manual searches from other sources are also carried out. Only scientific articles in English and Indonesian are considered for this review. Electronic and manual search results in 234 article identification. Based on the inclusion criteria, a full text copy of 71 articles was selected for analysis. Specific analysis was then made from 39 articles describing herbal medicines that can and have the potential to be used in Pediatric Dentistry to be very important for researchers and child health practitioners. Herbal medicines are expected to be an alternative solution when chemicals that are commercially used in the field of pediatric dentistry do not have advantages and good effectiveness when compared with herbal medicines to be discussed.

Keywords: Pediatric dentistry, Herbal medicine

INTRODUCTION

Nature has given us various plants that are useful in medicine to cure various diseases. This herbal plant has been described for medicinal use in history since 5000 BC. The use of natural ingredients as traditional medicine has been done since centuries ago. Herbal medicine has been widely accepted in almost all countries in the world. The use of herbal ingredients for traditional medicine is also widely practiced by the people of Indonesia. Traditional medicine can be used as an alternative to the main treatment ingredients. Raw materials for traditional medicines are easily obtained and the prices are relatively cheap.[1,2]

Herbal medicine is a form of Complementary and Alternative Medicine (CAM). Herbal medicine, botany is a plant that does not have the characteristics of a network of wood shrubs or trees. More specifically, herbal plants are plants that can be used medically or as ingredients to provide aroma. Spices with useful and effective properties are a source of treatment for various diseases. Many medicines used in Western medicine are called allopathic medicine derived from medicinal plants. Many support herbal therapy, it is believed because herbal extracts contain active ingredients.[3,4]

The use of herbal medicines must pay attention to pharmacology, side effects, herbal drug interactions and dosages, as well as the benefits of herbal medicines in dentistry. Because it does not rule out bad effects can occur when someone uses herbal medicines such as allergies.[3]

Herbal formulations consist of several different herbal combinations. Each of these herbs has extraordinary potential to cure dental disease. Herbal formulations can nourish our teeth by playing a role in countering various organisms that cause dental disease. The increasing interest in the potential benefits of herbal formulations along with its popularity as an ingredient has led researchers to conduct research on the chemical constituents and biological activities of herbal plants to be used as economical, feasible and provide cost-effective alternative treatments to cure dental diseases.[3,4]

Synthetic drugs are associated with several problems for example; drug resistance, high treatment costs and side effects especially when synthetic treatment is given to children which can have higher side effects than when giving herbal treatments to children. Traditional medicine is not

only easily available but also affordable. Recently, there has been an increase in the importance of using plants and vegetable products to treat dental diseases. The global market is starting to turn to herbal medicines which are considered as a prospective and realistic source of ingredients for dental care products especially in children.[4]

MATERIALS AND METHODS

Inclusion criteria:

- Research articles on results
- In vivo and in vitro studies
- The articles emphasize the efficacy of herbs in the field of pediatric dentistry

Exclusion criteria:

- Article review
- Articles whose abstract can only be read
- Studies are conducted on adults
- Study of diseases other than the field of pediatric dentistry

Search Methodology:

A comprehensive electronic search was conducted in the PubMed and Google Scholar databases to select full-text scientific articles in English published from January 1999 to December 2020, using the following terms in the search: pediatric dentistry and herbal medicine. Additional manual searches from other sources are also carried out. Only scientific articles in English and Indonesian are considered for this review. An electronic and manual search resulted in the identification of 234 articles.

According to the inclusion criteria, the article is needed to describe about herbal medicines that can and have the potential to be used in pediatric dentistry as many as 39 articles are identified. Abstracts are filtered beforehand to eliminate duplicates and articles that clearly fail to meet the search criteria. A copy of the manuscripts is then examined methodically to determine whether the inclusion criteria are met (Figure 1).

Fig.1: Flow chart explaining the search methodology and the number of articles included/excluded at each stage.

RESULTS

Table 1:Herbal Medicines in Children's Dentistry [5-44]

No.	Author and Title	Years	Conclusion
1.	Fani M, et al.	2012	Aloe vera (L.): has antidiabetic properties and increases immunity. Research has shown antimicrobial activity of toothpaste containing aloe vera in oral microorganisms, such as A. Viscosus, S. Mutans, and C. Albicans. The use of aloe vera gel at optimal concentrations in toothpaste.
	Inhibitory activity of Aloe vera gel on some clinically isolated cariogenic and periodontopathic bacteria		
	Journal: J Oral Sci. 2012; 54: 15-21		
2.	Begne MG, et al.	2001	Polygonum aviculare L.: A clinical study in students using Mexican sanguinaria extract as oral rinse for 14 days significantly reduced gingival inflammation.
	Clinical effect of Mexican sanguinari extract (polygonum aviculare l.) on gingivitis		

	Journal: Journal of Ethnopharmachology 2001; 74: 49		
3.	Marco AB, et al.	2008	Chatterjee et al evaluated 0.19% of A. indicia mouthwash in tests carried out in vivo and observed that Azadirachta indica mouthwash was as effective in reducing the periodontal index.
	Efficacy of a neem mouthrinse (Azadirachtaindica) in the treatment of patients with chronic gingivitis		
	Journal: Med Plant Res. 2008; 2(11): 341-6		
4.	Patil AG, et al	2017	Mangifera indica: Many popular herbal products are known to control dental plaque. Indica mangiferan leaves have biomedical applications including antioxidants or free radicals, cardioprotective hypo-allergenic, anticancer, hepatoprotective, analgesic, and immune modulator activity. Rich source of various biologically active compounds.
	Herbal formulation for the treatment of dental diseases : perfectives, potential, and applications		
	Journal: Researchgate. 2017: 31-40		
5.	Leal LSS, et al.	2016	Acacia farnesiana (L.): Ethanol extract obtained from the leaves has been shown to have anti-inflammatory activity. Proteins such as lectins with anti-inflammatory activity from the albumin fraction of A. farnesiana. Apart from anti-inflammatory and analgesic activity it is also found in the globulin fraction obtained from A. farnesiana seeds so that in dentistry, this plant can be used in treating toothache.
	The anti-inflammatory and antinociceptive effects of proteins extracted from Acacia farnesiana seeds		
	Journal: Revista Brasileira de Plantas Medicinais. 2016; 18(1): 38-47		
6.	Bihana S, et al.	2018	Asclepias curassavica L.: Asclepias curassavica Linn. is an upright and green bush belonging to the Asclepiadaceae family which can be used as an herbal plant, introduced as an ornamental plant in India. Ethanol extracts from all A. curassavica plants are reported to induce a lot of cardiovascular, anti-inflammatory, cytotoxic activity, antioxidant activity, effects of uterine stimulants, and many other pharmacological activities. Asclepias curassavica Linn has the composition of Dotriacontane which plays a role in Antimicrobial, antioxidant and antispasmodic.
	Gas chromatography-mass spectroscopy analysis of bioactive compounds in the whole plant parts of ethanolic extract of Asclepias Curassavica L.		
	Journal: International Journal of Green Pharmacy. 2018: 107-114		
7.	Gutierrez RMP	2016	Byrsonima crassifolia (L.): The bioactivity of this plant extract contains esters, epicatechin and glycolipids. Extracts from leaves, fruits, and bark show neuropharmacological, antioxidant, antibacterial, and anti-trypanocidal effects.
	Anti-inflammatory effect of birsonimadiol from seeds of byrsonima crassifolia		
	Journal: Food Sci Biotechnol. 2016; 25(2): 561-566		
8.	Lopez VGC, et al	2010	Heliopsis longipes: Heliopsis longipes S.F. Blake (Asteraceae) is an endemic herb plant in Sierra Gordo and Sierra Alvarez, where the root is used as a spice in sauces and spicy foods because it
	Analgesic activity of Heliopsis longipes and its effect on the		

	nervous system		has a flavor similar to chili;
9.	Bhat SS, et al.	2017	Carica papaya L.: Natural toothpaste or mouthwash marketed in Europe. Based on Sukardiman 2000 research showed that papaya leaf methanol extract has inhibitory activity against the enzyme DNA Topoisomerase II.
	Comprative evaluation of mangivera indica leaf mouthwash with chlorhexidine on plaque accumulation gingival inflammation, and salivary streptococcal growth.		
	Journal: Original Research. 2017; 28(2): 151-55		
10.	Setianingtyas P, et al.	2018	Black Tea: The content of chemical compounds in tea leaves can be classified into 4 major groups, namely: (1) phenol group; (2) Non-phenol groups; (3) aromatic group; and (4) enzymes. Catechins contained in black tea, especially epigallo-catechin (EGC), and epigallo-catechin gallate (EGCG) are able to inhibit the activity of the glucosil transferase enzymes (GTFs) produced by Streptococcus mutans.
	Effectiveness of black tea gargling on decreasing plaque accumulation in children aged 7-8 years		
	Journal: ODONTO Dental Journal. 2018; 5(1): 61-64		
	Setianingtyas P, et al.	2018	Tea Leaves (Camelia sinensis L.): Black tea (Camellia sinensis) is a type of tea commonly consumed by Indonesians and can also be used as a mouthwash. Black tea contains substances that prevent caries by blocking plaque formation. The ability to reduce plaque or anti-plaque effects on tea is known because of the presence of catechins which play an active role in inhibiting plaque formation.
	Effectiveness of black tea gargling on decreasing plaque accumulation in children aged 7-8 years		Carrot (Daucus-Carota) Aceh and Medan Carrot: Consuming carrots Aceh and Medan Carrot have a mechanical effect in reducing index debris. Decrease in Debris Index can occur due to consuming fibrous and solid food resulting in increased intensity and length of mastication carried out. Chewing movement will stimulate salivary secretion that contains anti-bacterial agents. Saliva can also remove food debris or rinse teeth, neutralize the acidic substances present and dissolve the sugar component from food scraps trapped in between the pits and fissures of the tooth surface. Carrot Aceh and Medan Carrot statistically proven to have the same effectiveness in reducing the debris index. This is due to Aceh carrots and field carrots have similarities that can help eliminate the debris index on the tooth surface. The equation is the same as having the same fiber and water content, and the texture of the fruit flesh is solid and hard.
	ODONTO Dental Journal. 2018; 5(1): 61-64		
12.	Lodytama, et al.	2014	Citrus Aurantifolia: Lime extract with various concentrations can reduce the plaque index. This is evident from the decrease in the dental plaque index for mouthwash lime extract. Decrease in dental plaque can occur because lime contains an alkaloid that functions as an anti-bacterial. Lime
	Effectiveness of lime extract solution (citrus aurantifolia) as a mouthwash to reduce plaque index in adolescents aged 12-15 years -		

	study at Nurul Islami Middle School, Mijen, Semarang ODONTO Dental Journal. 2014; 1 (1): 42-43		also contains flavonoids and attrition oils which have strong anti-microbial activity. Lime flavonoids also have the ability to modulate the activity of enzymes that can inhibit cell proliferation which is useful as an anti-microbial, anti-fungal, anti-viral
13.	Aljufri The effect of gargling with green tea on saliva ph in grade v students of grade 04 of malintang nervous, padang padang sub-district, padang city Journal: Tower of Science. 2017; 11 (74): 26-28	2017	Green tea: The nutritional content of green tea includes antioxidant polyphenols, fluoride, vitamin C, manganese, L-teanin, catechins, and caffeine. Catechin contained in green tea contains flour which can strengthen the structure of tooth enamel and reduce levels of acid produced by plaque bacteria. Flouride makes teeth more resistant to demineralization by acids and activates remineralization on the surface of the tooth so that caries does not easily occur.
14.	Sasmita IS, et al. Utilization of guava (psidium guajava) as a source of fluorine in the prevention of dental caries in children in the villages of Cikadu and Cileuleus Tasikmalaya Regency. Journal of science and technology applications for the community, 2012; 1 (1): 19-21.	2012	Guava (Psidium Guajava): Guava fruit has efficacy as an anti-oxidant, and increases body power. Chemical content of guava: tannins, essential oils, fatty oils, tanned substances, resin, triterpenoids and malic acid. Guava fruit contains amino acids (tryptophan and lysine), pectin, calcium, phosphorus, iron, fluorine, manganese, sulfur, vitamins A, B1 and C. Based on research guava fruit has pharmacological effects, in vitro decoction of guava leaves can inhibits the growth of bacteria that cause plaque Staphylococcus aureus.
15.	Achmad H, et al. Effectiveness of chitosan tooth paste from white shrimp (litopenaeusvannamei) to reduce number of streptococcus mutans in the case of early childhood caries Journal of International Dental and Medical Research. 2017; 10(2): 359	2017	Chitosan: Chitosan alternative material is an attractive ingredient as an antibacterial. Chitosan as an antibacterial against degradation in bacterial cell walls, the resulting damage to the cytoplasmic membrane cytoplasmic nucleus out of the bacterial cell wall. The solubility of organic chitosan ions inhibits hydroxapatitic acid, which is highly reactive with cariogenic foods.
16.	Doostkam A, et al. Punica granatum l. (pomegranate): a potential anti-microbial agent. Journal: Anti-Infective Agents. 2019; 17(1): 1-2.	2019	Punica granatum Linn.: Various kinds of pomegranate phytochemical compounds that show antimicrobial activity. Phytochemical analysis indicated that most pomegranate extracts were flavo-noids, tannins and polyphenols. Pomegranates also contain ellagitannin, hydroxybenzoic acid, such as ellagic acid. Quantitative pomegranate peel extract by the chromatography (HPLC) method. Pomegranate skin tracts contain gallic acid (34.03%) and catechins (3.31%).
17.	Faria RL, et al. Antimicrobial activity of calendula	2011	Calendula officinalis L.: Extracts produced from C. officinalis have been widely used in Europe since the 12th century as topical anti-inflammatory

	officinalis, camellia sinensis and chlorhexidine against the adherence of microorganisms to sutures after extraction of unerupted third molars		agents. Mouthwash containing C. officinalis shows the efficacy of this plant in reducing gingival bleeding.
	Journal: J Appl Oral Sci. 2011; 19(5): 477		
	Faria RL, et al.	2011	Polyphenol-Rich Cranberry: Cranberries are uniquely rich in several classes of bioactive flavonoids including flavonols, anthocyanins, and proanthocyanidins (PACs) (Type A), which provide significant therapeutic potential. Its richness in polyphenols has the ability which can be proven to inhibit bacterial adhesion in the formation of caries or cavities and chronic periodontitis (likes Streptococcus mutans, Streptococcus gordonii, or Porphyromonas gingivalis).
	Antimicrobial activity of calendula officinalis, camellia sinensis and chlorhexidine against the adherence of microorganisms to sutures after extraction of unerupted third molars		
	Faria RL, et al.	2011	Glycyrrhiza uralensis: Potential beneficial effects of licorice on dental disease. Glycyrrhizol A compound, ethanol extract from licorice, has been shown to show strong antibacterial activity against S. mutans.
	Antimicrobial activity of calendula officinalis, camellia sinensis and chlorhexidine against the adherence of microorganisms to sutures after extraction of unerupted third molars		
	Journal: J Appl Oral Sci. 2011; 19(5): 477		
18.	Jovito, et al.	2016	Extracts from leaves, stems and fruits can be used as antimicrobial and anti-inflammatory and are safe for consumption. The active component activity of experimental toothpaste can be directly linked to certain pathways of the inflammatory.
	Eugenia uniflora dentifrice for treating gingivitis in children: antibacterial assay and randomized clinical trial		
	Journal: Brazilian Dental Journal. 2016; 27(1)		
19.	Wanga Y, et al.	2018	Cinnamomum zeylanicum: Cinnamon bark essential oil (CBEO) usually contains very high concentrations of cinnamaldehyde and a small concentration of eugenol, among many other aromatic compounds.
	Antibacterial effects of cinnamon (cinnamomum zeylanicum) bark essential oil on bonou Porphyromonas gingivalis		
	Journal: Elsevier. 2018		
20.	Bonou J, et al.	2016	Cymbopogon citratus: Cymbopogon citratus family Poaceae with essential oil content of 98.16%, Myrcene (11.48%), neral (33.53%), geranial (43.10%), geraniol (5.58%) and geranyl acetate (4 , 47%).
	Effectiveness assessment of mouthwashes formulated from the essential oils of some beninese medicinal plants against oral germs		
	Journal: African Journal of microbiology research. 2016		
21.	Benso B, et al.	2015	Malva sylvestris: Malva sylvestris and its

			chloroform fraction minimize infection with A. actinomycetemcomitans and inflammation processes in human oral cells by suspected pathways involving.
	Malva sylvestris inhibits inflammatory response in oral human cells: an in vitro infection model		
	Plos One. 2015		
22.	Bettega PVC, et al.	2016	Nasturtium officinale: Nasturtium officinale R.Br. (Brassicaceae), is an herbal plant that is widely consumed as food. Along with this, it is used in traditional medicine to help in treating asthma, bronchitis, hypertension, as well as other diseases.
	Experimental confirmation of the utility of Nasturtium officinale used empirically as mouth lesion repairing promotor		
	Journal: Clinical& Experimental Pharmacology. 2016		
23.	Kong M, et al.	2016	Magnolia officinalis: Herbal-based flos caryophylli (clove) mouthwash is prepared orally to inhibit halitosis and consists of cloves, Fructus schisandrae, Radix glycyrrhizae, and Magnolia officinalis.
	The effect of clove-based herbal mouthwash on radiation-induced oral mucositis in patients with head and neck cancer: a single-blind randomized preliminary study		
	Journal: Depress. 2016		
24.	Rouy B, et al.	2015	Salvia officinallis: Studies on the antimicrobial potential of the Salvia genus show wide variability, depending on the sensitivity of microorganisms and the efficiency of the compounds being tested.
	The antibacterial effect of sage extract (Salvia officinalis) mouthwash against Streptococcus mutans in dental plaque: a randomized clinical trial		
	Journal: IJM. 2015		
25.	Adyanthaya A, et al.	2016	Spilanthes acmella: Bioactive components including lipophilic alkylamides, especially Spilanthol which are isolated from flower buds that are found to act against microbes including streptococcus, Enterococcus, Escherichia, Klebsiella and Salmonella species.
	Indian traditional medicinal herbs against dental caries – an unsung past to a bright future		
	Journal: Saudi Journal of Oral and Dental Research. 2016		
26.	Philip N, et al.	2019	Cranberry: In ancient times, cranberries were used to treat stomachaches, scurvy, and other liver diseases. They are rich in polyphenols and flavonoids. Dental caries can be treated with them. They have antibacterial and antimicrobial properties, thus preventing the inhibition of many pathogens and biofilms. Cranberries are uniquely rich in several classes of bioactive flavonoids including flavonols, anthocyanins, and proanthocyanidins (PACs) (Type A), which provide significant therapeutic potential.
	Polyphenol-rich cranberry extracts modulate virulence of streptococcus mutans candida albicans biofilms implicated in the pathogenesis of early childhood caries		
	Journal: Pediatric Dentistry. 2019; 41(1)		
27.	Ananda A, et al.	2018	Dayak Onion Bulbs (Eleutherine palmifolia (L.) Merr): It is a typical herbal plant of Kalimantan

	Inhibitory power of Dayak onion (eleutherine palmifolia (l.) Merr) extract on the growth of streptococcus mutans Journal: DENTIN. 2018; 2 (1)		which has the potential as an alternative mouthwash. Dayak bulb extract contains antibacterial properties, one of which is phenol as the largest content with a concentration of 34.20% which can damage bacterial cells so that the growth of Streptococcus mutans decreases and lysis.
28.	Abdelmagyda HA, et al. Herbal medicine as adjunct in periodontal therapies- Clinical trials in past decade Journal: Elsevier. 2019	2019	Coriandrum sativum L.: Coriandrum sativum a member of the Umbelliferae family is an important component of ancient Iranian medical practices used for the treatment of flatulence. It can reduce bacterial activity in the periodontium and are therefore a combination of choices in clinical studies. Oral gel does not show significant advantages compared to scaling and root planing in addition to the results of periodontal therapy.
29.	Chandwani M, et al. Effectiveness of morinda citrifolia juice as an intracanal irrigant in deciduous molars: an in vivo study Journal: Dent Res J. 2017; 14: 246-51	2017	Morinda citrifolia: Morinda Citrifolia, commonly known as noni which is a tree in the coffee family, Rubiaceae. Citrifolia juice (MCJ) has various therapeutic effects including immune enhancing effects. The antibacterial effect of MCJ is mainly associated with L-asperuloside and alizarin compounds.
30.	Kumar VM, et al. The antimicrobial effectiveness of 25% propolis extract in root canal irrigation of primary teeth Journal: Journal of Indian Society of Pedodontics and Preventive Dentistry. 2014; 32(2)	2014	Propolis: Propolis is a natural product that is increasingly in demand because of its antimicrobial activity against various pathogenic microorganisms. It consists of resins and balms (50-60%), pollen (5-10%), and other constituents.
31.	Sotomil JM, et al Curcumin—a natural medicament for root canal disinfection: effects of irrigation, drug release, and photoactivation Journal: J. Endod. 2019.	2019	Curcuma Longa:Among natural compounds with known anti-inflammatory and antimicrobial, curcumin is a plant derived agent (turmeric root) which also shows antioxidant and anticancer effects, so it has significant clinical relevance related to the prevention and treatment of various diseases.
32.	Elheeny AAH Allium sativum extract as an irrigant in pulpectomy of primary molars: A 12-month short-term evaluation Journal: Clin Exp Dent Res. 2019; 1–7	2019	Allium sativum (garlic): A. sativum has a therapeutic effect through a broad spectrum antibacterial effect and fewer cytotoxic effects. The antimicrobial properties of allicin are mainly associated with inhibition of total RNA, suggesting that RNA is the main target of allicin action.
33.	Divya S, et al. Evaluation of antimicrobial effect of triphala versus conventional rootcanal irrigants in primary teeth - an in vivo study	2019	Triphala: Triphala has very good antibacterial and anti-inflammatory properties. Several in vitro and microbiological studies have supported the use of triphala as an irrigation root canal and intracanal medical. There is some literature about in vivo studies using triphala as an irrigant root canal in primary teeth. Triphala is used as an irrigant test

	Journal: Research J. Pharm. and Tech. 2019; 12(2)		because it is proven safe, which contains active ingredients derived from three different herbal medicinal plants. They are responsible for its beneficial properties such as antioxidants, anti-inflammatory and may have additional effects on the traditional root canals of irrigants.
34.	AlSadhan RI, et al.	1999	Neem: Miswak extract has higher antimicrobial properties against various types of microorganisms than E. faecalis, when used as a mouthwash or toothpaste.
	Miswak (Chewing stick): A cultural and scientific heritage		
	Journal: Saudi Dent J. 1999; 11(2): 80-8		
35.	Tewari RK, et al.	2016	Orange oil: Orange oil consists of limonene, aliphatic hydrocarbon alcohols, and aldehydes such as octanal. This material serves as a substitute for chloroform and xylene which are good for softening GP and releasing endodontic sealers in dental re-treatment.Orange oil has no harmful effects, has low solubility in water, and dissolves in alcohol. It processed orange oil, and tetrachlorethylene can be used to soften GP/resilon during re-treatment with various techniques.
	Role of herbs in endodontics		
	Journal: Journal of Oral Research and Review. 2016; 8(2): 95-99		
	Tewari RK, et al.	2016	Arctium lappa (Burdock): Arctium lappa is used for intracanal dressing because it contains ethyl acetate. Arctium lappa has antifungal, antioxidant, and anxiolytic properties. Other benefits include the anti-aggregation effect of platelets, and the treatment of immunodeficiency virus inhibition in humans. In endodontics, Arctium lappa is mainly used to treat root canal infections because of its antimicrobial properties which prevent biofilm formation and are effective against harmful pathogens.
	Role of herbs in endodontics		
	Journal: Journal of Oral Research and Review. 2016; 8(2): 95-99		
	Tewari RK, et al.	2016	Casearia sylvestris: Casearia sylvestris is an herbal plant from Brazil originating from the silicaceae plant class. This plant is in great demand in the population of people in Brazil because this plant has a good anti-infalamation effect. Casearia sylvestris is rich in phospholipase A2 inhibitors which makes it an ideal anti-inflammatory drug for use as an intracanal medicine.
	Role of herbs in endodontics		
	Journal: Journal of Oral Research and Review. 2016; 8(2): 95-99		
36.	Ambati NR, et al.	2017	Curcumin: Curcumin is a phenolic compound that has shown bactericidal properties when tested clinically with greater drug effects such as antioxidants, anti-inflammatory and anti-microbial properties that might prove beneficial in dentistry. Endophlast has the advantage of having the ability to disinfect dentinal tubules and accessory channels that are difficult to reach, at the same time being associated with losses causing periapical irritation caused by its liquid component, eugenol.
	Journal of biomedical and pharmaceutical research case report the success rate of endoflas powder mixed with curcumin gel as obturating material in primary molars: case-series		
	Journal: Journal of Biomedical and Pharmaceutical Research. 2017; 6(2): 100-106		

37.	Adamkova H, et al.	2004	Chordata macleya and Prunella vulgaris: It shows the presence of cytoprotective, antioxidant, antiviral and anti-inflammatory effects.
	Macleya cordata and prunella vulgaris in oral hygiene products – their efficacy in the control of gingivitis		
	Journal: Biomed Papers. 2004; 148(1): 103–105		
38.	Taheri JB, et al.	2011	Chamomile: Other active constituents include flavonoids, apigenin, luteolin, and quercetin. This active ingredient contributes to the anti-inflammatory and antispasmodic relaxation actions and is used for inflammation of the gums and periodontal disease as a mothwash and also made as toothpaste.
	Herbs in dentistry		
	Journal: . International Dental Journal. 2011; 61: 287–296		
39.	Savarkar S, et al.	2019	Lemon (Citrus Limon (L) and Salt (Sodium Carbonate): Lemon extract which contains higher amounts of citric acid and helps whiten some areas of yellow teeth naturally. Acidic ingredients also help improve oral hygiene. Among natural products, salt and Lemon is known in teeth whitening, vinegar / acid solution plays an important role in teeth whitening.
	Efficacy study of whitening toothpaste containing lemon (citruslimon (l) and salt (sodium carbonate)		
	Journal: On J Dent & Oral Health 2019. 2(3)		

DISCUSSION

This review reveals the potential and high use of herbs in pediatric dentistry. Herbal medicines have been used for years, and their history can be rooted in ancient civilizations, where their role as the main source of treatment has been proven in table 1.

Utilization of herbal plants in pediatric dentistry is very diverse in its usefulness, especially used as an active ingredient in toothpaste to suppress the bacteria that causes caries and prevent the formation of dental plaque in children. Herbal remedies that can be used for toothpaste include Aloe vera (L.), Chamomile, Chordata macleya and Prunella vulgaris, Eugenia uniflora L, Carica papaya L., Neem, propolis, Cranberry, Spilanthes acmella, Salvia officinallis, Malva sylvestris, Cymbopogon citratus, Cymbopogon citratus, Cinnamomum zeylanicum, Glycyrrhiza uralensis, Polyphenol-Rich Cranberry, Punica granatum Linn, Chitosan, Green Tea, Black Tea, and Mangifera indica. This is because these plants have high antimicrobial properties against various types of carious microorganisms such as Streptococcus mutans.[45,46,47]

Besides caries, periodontal disease can also be treated with herbal plants. Herbal remedies used to cure periodontal disease based on this review are Aloe vera (L.), Chamomile, Neem, Azadirachta indica, Eleutherine palmifolia (L.), Magnolia officinalis, Malva sylvestris, Cinnamomum zeylanicum, Psidium Guajava, Citrus Aurantifolia, L. Daucus-Carota), Camelia sinensis L., Polygonum aviculare L., and Coriandrum sativum L. The active ingredients of this herbal plant generally reduce plaque and gingivitis so that they are also used in the treatment of periodontal therapy. The active ingredient of this herbal plant also contributes to the anti-inflammatory action of the mouth, especially the gums.[48,49,50]

The use of herbal medicines in the field of endodontics in pediatric dentistry is also growing rapidly. This herbal medicine is derived from Morinda citrifolia, Curcumin, Casearia sylvestris, Arctium lappa, Orange oil, Curcuma Longa, Allium sativum, Triphala, Calendula officinalis L., and Propolis. The herbal remedy has excellent antibacterial and anti-inflammatory and antioxidant properties as an irrigation root canal and intracanal medical. There is some literature about in vivo studies using this herbal medicine as an irrigant root canal in deciduous teeth. This herbal medicine is also used as an irrigant test because it is proven safe.[51,52,53]

Herbal remedies are also used in teeth whitening in Citrus Limon (L) and Salt (Sodium Carbonate) plants. Lemon extract contains a higher amount of citric acid and helps whiten some areas of yellow teeth naturally. Acidic ingredients also help improve oral hygiene. Not only that, the occurrence of canker sores can also be treated with herbal medicine namely Nasturtium officinale.

N. officinale as an assistant in treating thrush and accelerated the process improvement. So this herbal medicine is a better alternative for patients suffering from canker sores.[11,42,44,54]

Then, herbal medicine in dentistry is also used to treat or treat toothache. These herbal remedies are Acacia farnesiana (L.), Heliopsis longipes, Byrsonima crassifolia (L.), and Asclepias curassavica L. These herbal medicines have analgesic properties that play a role in anti-inflammatory, and antihistamines.[49,55]

CONCLUSION

Herbal medicines in the field of pediatric dentistry are very diverse. Very many herbal plants that have benefits in treating dental and oral diseases in children. Further development and research on the use of herbal plants will greatly assist in creating the latest therapeutic innovations with the use of herbal medicines.

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