



Formulation And Evaluation Of Polyherbal Toothpaste

Miss. Nikita Dhage¹, Miss. Neha Tongire²

¹Student of Yashodeep Institute Of Pharmacy, ²Assistant Professor

¹B. Pharmacy

Yashodeep institute of pharmacy, Chhatrapati Sambhajinagar, Maharashtra, India

ABSTRACT

The main objective of the research is the formulation and evaluation of Polyherbal toothpaste.. Toothpaste is usually used to clean tooth enamel and mouth It is also used to solve many enamel problems. Many dentists recommend applying toothpaste to treat diseases such as sensitivity, chronic gingivitis, etc. Herbs like Gokhru, Neem ,Tulsi ,Amla,Turmeric . These herbal toothpastes are evaluated by various tests such as physical examination, pH determination, Homogeneity, Abrasiveness,Spreading,foaming ,stability study,,Anti-microbial activity etc. The aim of this study is to formulate herbal toothpaste that is good for oral hygiene and bleeding gums. Oral hygiene means prevention of oral infections and gum diseases. . formulation and evaluation of Polyherbal toothpaste aimed at assessing its efficacy and safety. The research involved formulating a Polyherbal toothpaste using a blend of herbal Drug for their dental health benefits. Evaluation methods included testing for antimicrobial activity, abrasiveness, Organoleptic, Spreading,foaming.Results indicated antimicrobial, anti-Bacterial &Anti-inflammatory properties.

Key Words:- Gingivitis ,Anti bacterial ,Sensitivity ,Anti microbial, herbal Treatments, Toothache and Gums, Polyherbal toothpaste,

INTRODUCTION

Herbal and Herbal based toothpaste has been used since many years ago in ancient life and is one of the main important components of oral health care. The manufacturing and development of toothpaste formulations began in China and India, as 300-500 BC. During that period, squashed bone, pulverized egg and clam shells were utilized as abrasives as a part of tooth cleaning. Modern toothpaste formulations were developed in the 19th century.

Toothpaste is an agent used as an effective home care system. It is a paste or gel dentifrice used with a toothbrush as an accessory to clean and maintain the aesthetics and health of teeth by the patients to enhance oral hygiene.

Toothpaste is used to promote oral hygiene. Although, brushing teeth twice a day and daily flossing is highly effective in plaque reduction, over 50% of adults have gingivitis on an average of 3 to 4 teeth. Toothpastes are daily oral care products, the chemical composition of which is constantly changing due to manufacturer's competition. Toothpastes are recognized as the best source of fluoride, which most effectively protects both deciduous and permanent teeth from caries.

However, fluorides are not the only active ingredients in toothpastes. Also important are the cleaning abilities of toothpaste provided by abrasives and the antibacterial qualities, which, in turn, are provided by a variety of substances with different abilities to inhibit the growth of germs in the oral cavity. Dental caries is a disease caused by bacteria that produces and releases acid into the biofilm and saliva and dissolves the crystal structure of enamel (hydroxyapatite).

1.1 Tooth –

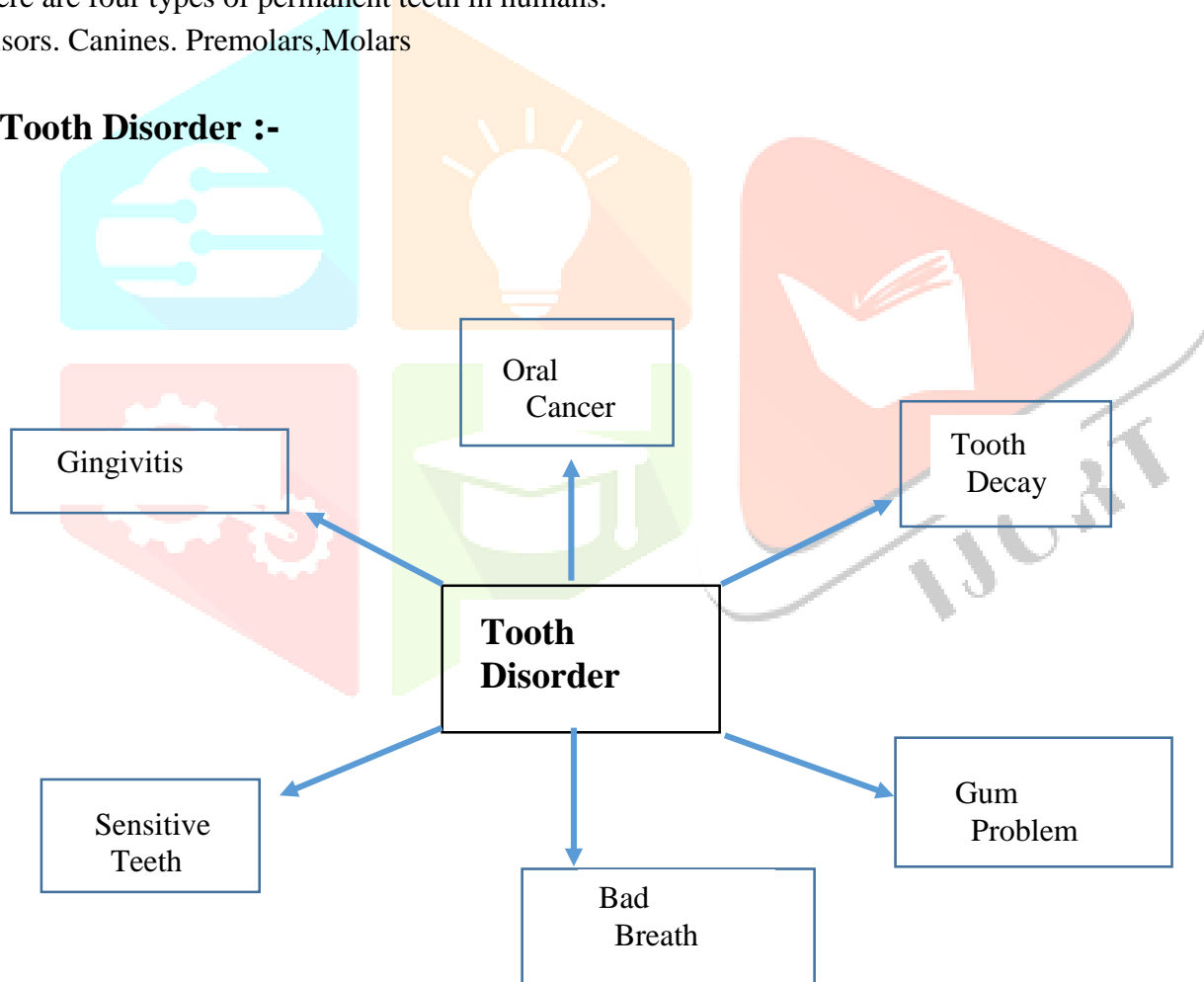
tooth, plural teeth, any of the hard, resistant structures occurring on the jaws and in or around the mouth and pharynx areas of vertebrates. Teeth are used for catching and masticating food, for defense, and for other specialized purposes. Human teeth function to mechanically break down items of food by cutting and crushing them in preparation for swallowing and digesting.

Types of Tooth

There are four types of permanent teeth in humans:

Incisors. Canines. Premolars, Molars

1.2 Tooth Disorder :-



1. Tooth Decay

Tooth decay is also known as dental caries or dental cavities. It is the most common dental problem that dentists see in patients. Practically everyone, at some point in their life, has experienced tooth decay.

Tooth decay occurs when bacteria form a film, called plaque, on the surface of teeth. The bacteria produce acids from the sugars in food. The acids eat away at and permanently damage the enamel, or outer layer, of the tooth. The acids then start working on the softer dentin layer beneath the enamel.

This breakdown of the tooth can lead to cavities or holes in your teeth. It can also cause toothaches, including pain when you eat and drink hot, cold, or sweet things.

Other symptoms of tooth decay may include:

- Bad breath
- Black or brown spots on your teeth
- An unpleasant taste in your mouth

2. Gum Disease

Gingivitis is the early stage and mild form of gum or periodontal disease. It is a bacterial infection that is caused by the buildup of plaque. Common symptoms are gums that are red, swollen, and bleed easily. You may also experience bad breath and sensitive teeth that hurt when you chew.

Skipping brushing and poor brushing techniques can contribute to gum disease. So, too, can crooked teeth that are hard to brush properly. Other risk factors include tobacco use, pregnancy, and diabetes.

Periodontitis

Left untreated, gingivitis can become a more severe form of gum disease called periodontitis. This is when pockets in the gum become infected. This can lead to damage of the bone and tissue that hold the teeth, as these, too, become infected. It can also lead to

- Shrinking and receding gums
- Loose permanent teeth.
- An unpleasant taste in your mouth
- Persistent bad breath.

3. Bad Breath

Bad breath or halitosis is one of the most common dental problems. It is also among the most distressing. Bad breath can be caused by several different factors, including:

- Poor oral hygiene
- Dry mouth
- Medication
- Infection

One or more of the foods you eat could also be the cause of your halitosis. Spices such as garlic and onion are common culprits.

4. Gingivitis

Gingivitis is an early form of gum disease and typically produces mild symptoms. There are two main types of gingivitis. Dental plaque-induced gingivitis when plaque buildup irritates a person's gums, resulting in inflammation, discoloration, and pain. And In nonplaque-induced gingival lesions can result from a bacterial, viral, or fungal infection. The signs and symptoms of gingivitis include:

- gum inflammation and discoloration

- bleeding from the gums when brushing or flossing
- Receding Gums

Benefits of Polyherbal Toothpaste

1. Herbal toothpaste provides germ protection
2. Herbal toothpaste of gum related issues
- 3 Herbal toothpaste reduces sensitivity of the teeth
4. Herbal toothpaste provides fresh breath
5. Herbal toothpaste significant plaque reduction
6. Cleans your teeth safely
7. Effectively refreshes your breath.
8. Prevents and calms gum pain.
9. Stain Remover.
10. Safe for children.



Plant Profile :

1) GOKHRU

Tribulus terrestris is an Annual plant in the caltrop family widely distributed around the world. It is adapted to thrive in dry climate locations in which few other plants can survive.



Fig.1 Gokhru

Synonym:-Caltrops fruit.

Biological source :-

It is the dried ripe seeds of *Tribulus terrestris* Linn., belonging to family Zygophyllaceae.

Chemical constituent:-

Chlorogenin, Saponin, Diosgenin, Kameferol

Uses of Gokhru

1. antioxidant properties .
2. antibacterial property.
3. dental carries.

2) AMLA

Amla or Indian gooseberry is classified among the most potent herbs in Ayurveda which has multiple benefits, especially for teeth and gums.

Synonym :- Emblica, Indian goose berry, amla.

Biological Source:-

This consists of dried, as well as fresh fruits of the plant *Emblica officinalis* Gaerth (*Phyllanthus emblica* Linn.), belonging to family Euphorbiaceae

Chemical constituents:-

Emblicanin A and B, punigluconin, pedunculagin, Gallic acid, chebulagic acid, geraniin, ellagic acid, Corilagin

Uses of amla:-

It helps keep your mouth clean.

Amla fights dental cavities.

It increases salivary pH and inhibits the common bacteria responsible for caries.



Fig .2. Amla

3) Neem

Azadirachta indica, commonly known as margosa, neem, nimtree or Indian lilac is a tree in the mahogany family Meliaceae. Neem is a strong antioxidant, neutralizing free radicals that may influence the development of some conditions. It is also a strong anti-inflammatory agent.

Synonym :- *Melia Azadirachita*

Biological source:-

Neem consists of the fresh or dried leaves and seed oil of *Azadirachta indica* J. Juss. Family-meliaceae

Chemical constituents :-

Nimbin, Azadirachtin, Azadiradione, salannin, Meliantriol, Gedunin, azadirone, nimolicinol

Uses of neem :-

Neem has antibacterial properties,



Fig.3. Neem

3) Tulsi

Basil is an excellent shrubs and known as queen of herbs. The tulsi plant is a perennial herb with a typical aromatic smell. It is native to India and parts of northern Africa, Hainan Island, and Taiwan.

Synonym :- Holy Basil, Sacred basil

Biological source :-

Tulsi consist of fresh and dried leaves of *ocimum sanctum* linn., belonging To Family Labiatae

Chemical Constituent :-

Eugenol, methyl Eugenol, Carvacrol, Volatile oil Glycoside

Uses:-

Anti – bacterial, Anti-fungal
Helps prevent Gum Disease



Fig.4. Tulsi

5) Cloves

Clove is largely used as dried whole buds. Ground clove is used for curry mixtures and clove oil is used for flavoring foods and in pharmaceutical perfumery industry. Cloves are commercially harvested primarily in Indonesia, India, Madagascar, Zanzibar.

Synonym :- Lavang, Clove Bud, Clove Flower

Biological source :- It consists of a dried flower bud of *Eugenia caryophyllus* Family: Mirtaceae

Chemical constituents :- Clove consist of about: Volatile oil (15-20%), Eugenol (70-90%), Acetyl Eugenol, α , β -Caryophyllene, Tannins Other substances mainly methyl furfural.

Uses :-

Dental analgesic
Control of gingivitis, Plaque



Fig .5 Clove

6)Turmeric

The plant is a native to southern Asia and is cultivated extensively in temperate regions. It is grown on a larger scale in India, China, East Indies and Pakistan.

Synonym :- Indian saffron, Haldi, Curcuma

Biological Source :-

Turmeric is the dried rhizome of *Curcuma longa* Linn. Family Zingiberaceae.

Chemical Constituents:-

Curcumin, Curcuminoids, Cymene, Tumeron.

Uses of Turmeric :-

Natural anti-inflammatory

Anti-cancer Effect, Powerful antioxidant Protect .



Fig 6 . Turmeric

Material & Method

- **Formulation Table:-**

Sr No	Ingredient	Quantity	Uses
1	Gokhru powder	2gm	Anti – bacterial
2	Amla Powder	1.5 gm	Astringent
3	Tulsi Powder	1.5 gm	Prevent gum Disease
4	Clove Powder	1.5 gm	Antiseptic
5	Neem Powder	1 gm	Anti-bacterial
6	Turmeric	1 gm	Anti-inflammatory
7	Peppermint oil	3-4 drops	Flavouring Agent
8	Alum powder	0.8 gm	Gingivits problem
9	Glycerin	0.5 ml	Humectant
10	Starch	1.5 gm	Binder
11	Benzoic acid	0.6 gm	Preservative

12	Sodium chloride	0.5 gm	Preservative
13	Sodium Lauryl Sulphate	0.6 gm	Foaming Agent
14	Demineralized water	q.s	-



Fig 7 .1 Alkaloid Test

- **Phytochemical Screening Test For Herbal drug :-**

Sr.No.	Chemical constituent	Test	Observation	Result
1	Alkaloid	Mayer's Test	Apperance of Yellow Cream ppt	Positive
		Wagner's Test	Redish Brown Precipitate	Positive
		Hager's Test	Formation of yellowish white ppt	Positive
		Dragandroff's Test	Red Precipitate	Positive
2	Glycoside	Legal Test	Pink To Red colour form	Positive
		Baljet Test	Yellow Orange Colour	Positive
		Keller-killiani Test	Redish Brown Colour	Positive
3	Tannin	Ferric Chloride Test	Black or Blue Colour Form	Positive
		Gelatin Test	Formation of White precipitate	Negative
4	Flavonoids	Shinoda test	Red To Pink Colour	Positive



Fig 7.2 Glycoside Test

Procedure :

All Herbal Ingredient were Dried & grounded using Domestic mixer.

Weigh accurately all herbal drug & Sieved with sieve no.80

Add sodium chloride and Benzoic acid (as a preservative) in a Mortar pestle.

Add sodium lauryl sulphate using as foaming agent and sodium saccharin are added as a sweetener agent .

Add Glycerin as humectant and Starch are used as a binder.

Triturated well and to of demineralized water was added to make up the to 20gm



Fig 8.1 Trituration Method



Fig 8.2. Formulation of Polyherbal Toothpaste

• Evaluation of Polyherbal Toothpaste

1) Organoleptic :-

1. Colour- Toothpaste was evaluated for its Colour. The visually colour checked.

2. Odour- Odour was found by smelling the product.

3. Taste- Pleasant and tingling fresh due to peppermint, sweet due to sod. Saccharin .

2) Moisture Content:-

Toothpaste (10 gm) weighted in a Porcelain dish and dried it in the oven at 105 o C. It was cooled in a desiccater. The loss of weight is recorded as percentage moisture content and calculated by the given formula.

$$\% \text{ Moisture} = \frac{\text{Original sample weight} - \text{dry sample weight}}{\text{Original sample weight}}$$

3) pH Determination :-

pH was tested by dissolving 1 gm product in to 9 ml of water and shaken vigorously then aqueous solution and pH is observed by pH meter.



Fig 7.3. Tannin Test



Fig.9 pH Determination

4) Foaming :-

The foamability of formulated toothpaste evaluated by taking small amount of formulation with water in measuring cylinder initial volume was noted and then shaken for 10 times. Final volume of foam was noted

Determination of froth power Foaming power = $V_1 - V_2$

V1- Volume in ml of foam with water.

V2- Volume in ml of water only.

5) Stability

The stability study was performed as per ICH guideline. The formulated paste was filled in collapsible tube and stored at different temperature and humidity conditions, $25^{\circ}\text{C} \pm 2^{\circ}\text{C} / 60\% \pm 5\% \text{RH}$, $30^{\circ}\text{C} \pm 2^{\circ}\text{C} / 65\% \pm 5\% \text{RH}$, $40^{\circ}\text{C} \pm 2^{\circ}\text{C} / 75\% \pm 5\% \text{RH}$ for the period of three months and studied for appearance, pH and spreadability.

6) Relative density

Relative density was determine by weight in gram taken in 10 ml formulation and 10 ml distilledwater using RD bottle Evaluation Parameters.

7) Abrasiveness

Extrude the content 15-20 cm long on the butter paper, repeat the same process for at least ten collapsible tubes. Press with the contents of the entire length with fingertip for the presence of In sharp andhard edged abrasive particles. Toothpaste shall not contain such particles.

8) Determination of spreadability

this method slip and drag characteristic of paste involve. Formulated paste (2g) placed on the ground slide under study. The formulated paste placed like sandwich between this slide and another glass slides for 5min to expel air and to provide a uniform film of the paste between slides. Excess of the paste was scrapped off from the edges. The top plate was then subjected to pull of 80g with the help of string attached to the hook and time (sec) required by the top slide to cover a distance of 7.5cm was noted. A short interval indicated better spreadability

Formula was used to calculate spreadability:

$$S=M \times L / T$$

Where,

S= Spreadability

M= Weight in the pan (tied to the upper slide)

L= Length moved by the glass slide

T=Time (sec) taken to separate the upper slide from the ground slide

Result & Discussion :-

1) Phytochemical Screening Test

Sr.No.	Chemical constituent	Test	Observation	Result
1	Alkaloid	Mayer's Test	Apperance of Yellow Cream ppt	Positive
		Wagner's Test	Redish Brown Precipitate	Positive
		Hager's Test	Formation of yellowish white ppt	Positive
		Dragandroff's Test	Red Precipitate	Positive
2	Glycoside	Legal Test	Pink To Red colour form	Positive
		Baljet Test	Yellow Orange Colour	Positive
		Keller-killiani Test	Redish Brown Colour	Positive
3	Tannin	Ferric Chloride Test	Black or Blue Colour Form	Positive
		Gelatin Test	Formation of White precipitate	Negative
4	Flavonoids	Shinoda test	Red To Pink Colour	Positive
		Lead Acetate Test	Formation Of Yellow Precipitate	Positive
5	Triterpenoids	Salkowski test	Golden Yellow Colour	Positive

2) Evaluation Test Parameter

Sr No	Parameter	Observation
1	Colour	Brownish
2	Odour	Characteristic
3	Taste	Pleasant
4	pH	8.2
5	Foamability	Good
6	Moisture Content	15.46%
7	Stability	Stable
8	Abrasiveness	Good Abressive
9	Relative Density	10.2

CONCLUSION

Based on the result this study we concluded that Polyherbal toothpaste caused significant reduction in Plaque levels and gingival inflammation & It is an effective for Anti-microbial, Anti-Bacterial and Anti-inflammatory Properties. The lab Prepared Formulated Polyherbal toothpaste Has good Organoleptic, foaming, Spreading, Abrasive Property & Anti-microbial Properties. It Has the advantage of absense of Harmful chemical & Presence of Herbal Powder with wide spectrum of natural compound benifical for teeth & oral cavity compared to convential toothpaste.

The research concluded that Polyherbal toothpaste an Emphasizing and more acceptable in dental research and They are safer with minimum side effect than synthetic Preparation. The formulated toothpaste capable to the Toothpaste and oral hygiene show the antimicrobial Activity against pathogen. It included that formulated Polyherbal toothpaste was found to be good quality & Have Physicochemocal properties. It is free from harmful & it is Economical with good Quality.

Reference

- 1)Abhay S, Dinnimath BM, Hullatti KK. Formulation and spectral analysis of new polyherbal toothpaste. *Journal of Drug Delivery and Therapeutics*. 2014 Nov 15.
- 2)Singh K, Singh P, Oberoi G. Comparative study between herbal toothpaste (dantkanti) and nonherbal Toothpaste. *Int J Dent Res*. 2016 Feb.4.
- 3)Panda S, Nayak M, Nayak S. A review on caffeinated toothpaste. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017 Nov 19.
- 4)Ogboji J, Chindo IY, Jauro A, Boryo DE, Lawal NM. Formulation, physicochemical evaluation and antimicrobial activity of green toothpaste on streptococcus mutans. *International Journal of Advanced Chemistry*. 2018 Jan.8.
- 5)Panda S, Nayak M, Nayak S. A review on caffeinated toothpaste. *World Journal of Pharmacy and Pharmaceutical Sciences*. 2017 Nov 19.
- 6) Grace XF, Darsika C, Sowmya KV, Afker A, Shanmuganathan S. Preparation and evaluation of herbal dentifrice. *International Research Journal of Pharmacy*. 2015.
- 7)Shukla KV, Kumari D. Formulation Development and Evaluation of Herbal Toothpaste for Treatment of Oral Disease. *Journal of drug delivery and Therapeutics*. 2019 Aug 18.
- 8)Gautam D, Palkar P, Maule K, Singh S, Sawant G, Kuvalekar C, Rukari T, Jagtap VA. Preparation, Evaluation and Comparison of Herbal toothpaste with marketed Herbal toothpaste. *Asian Journal of Pharmacy and technology*. 2020.
- 9) Koshy A, Kesavappa S, Eshwar S, Jain V, Chinna S. A comparative evaluation of anti plaque efficacy and consumer satisfaction of a herbal toothpaste and a commercially available non-herbal toothpaste: A randomised controlled trial. *Int J Sci Res*. 2019.
- 10)Hosadurga R, Bolor VA, Rao SN, MeghRani N. Effectiveness of two different herbal toothpaste formulations in the reduction of plaque and gingival inflammation in patients with established gingivitis—A randomized controlled trial. *Journal of traditional and complementary medicine*. 2018 Jan 1.
- 11) Mangilal T and Ravikumar Mazumdar M, Makali, Chandrika M and Patki PS. Evaluation of the Safety and Efficacy of Complete Care Herbal Toothpaste in Controlling Dental Plaque, Gingival Bleeding and Periodontal Diseases., *Journal of Homeopathic and Ayurvedic Medicine*. 2013.
- 12). Sherikar AS and Patil RA. Standardization of polyherbal formulations: containing *Cassia angustifolia*. *International Journal of Pharmacy and Life Sciences*. 2010.
- 13) Nayak A, Ranganathan N, Sowmya GB, Kishore B, Kudalkar M. Evaluation of antibacterial and anticandidal efficacy of aqueous and alcoholic effect of neem (*Azadirachta Indica*): An Invitro study. *Int J Res Ayurveda Pharm*. 2011.

- 14)Tatikonda A, Debnath S, Chauhan VS, Chaurasia VR, Taranath M, Sharma AM. Effects of herbal and non-herbal toothpastes on plaque and gingivitis: A clinical comparative study. Journal of International Society of Preventive & Community Dentistry. 2014 Dec 4 .
- 15)Unachukwu MN, Nwakanma C, Ejim CJ. The Effects of selected toothpaste on the microbial flora of the mouth of GOU Student. International Journal of Current Microbiology and Aplied Sciences. 2018 Jun 21.
- 16) Deng Y, Zhu F, Zhong T, Luo N, Lei L, Cheng L, Hu T. The efficacy and safety of a herbal toothpaste in reducing gingivitis: a double-blind, randomized, placebo-controlled, parallel allocation clinical trial. Evidence-Based Complementary and Alternative Medicine. 2019 Feb 3.
- 17) Basch CH, Kernan WD. Ingredients in children’s fluoridated toothpaste: A literature review. Global journal of health science. 2016 Jul 12.
- 18)Janakiram C, Venkitachalam R, Fontelo P, Iafolla TJ, Dye BA. Effectiveness of herbal oral care products in reducing dental plaque & gingivitis—a systematic review and meta analysis. BMC complementary medicine and therapies. 2020 Dec;20.

