

Comparative Evaluation of a Herbal Mouthwash Containing *Mimusops Elengi* Linn with Listerine in Inhibiting Plaque and Gingivitis

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ABSTRACT

Background: Ayurveda is an integral part of traditional Indian system of medicine. WHO survey report suggests that above 80% population of the developing countries use traditional or local medicine, which is originally a part of ayurveda. Herbal medicines turn out to be “safe”, as they are without addition of any synthetic chemical. *Mimusops elengi* Linn is one such herb with its potential medicinal values since ancient times in India. Different parts of this plant such as leaves, twig, bark, stem, root, fruits, seeds, and flowers have been described in literature to be used in different concentrations or in combination with other herbal materials to improve oral health. The extract of bark has shown significant antioxidant potential and scavenging property. The ethanolic, methanolic, acetone, petroleum and water extract of bark showed antibacterial property against different strains of *Streptococcus* and *Staphylococcus* species. This plant needs to be further explored regarding its properties in periodontal field for refined drug formulations, which can be economical as well as beneficial for majority of population in developing countries.

Keywords: *Mimusops Elengi* Linn, Listerine, Periodontal disease.

INTRODUCTION

Ayurveda, also considered as Upaveda is an integral part or supplement of vedic system. Reports of WHO survey suggests that upto 80% of population use traditional or local medicine, which is basically a part of ayurveda.¹ Herbal products are very “safe”, natural, without addition of any chemical ingredients. They have gained increasing popularity not only because of their less toxic and adverse effects but also to their easy availability. The natural medicines from plants are mainly derived from roots, leaves, fruits, barks and seeds. One such herb

is *Mimusops elengi* Linn commonly known as Bakul. It is a large, tall evergreen tree of family Sapotaceae where Linn represents “Carl Linnaeus” the pioneer describer of the modern taxonomy of plants. Various other nomenclature of this tree are ‘Spanish cherry’ in English; Sanskrit literature mentions it as ‘Maulsari’ or ‘Chirapushpa’; ‘Elengi’ in Malayalam and commonly known as ‘Ranja’ in Kanada.² It is found in most of the areas of the Indian subcontinent and attains a height of almost 15-16 meters.³

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Fig 1: Stem Bark of *Mimosa elengi linn.*



Fig 2: Listerine.



Fig 3: Disclosing agent.



Fig 4: Soxhlet extraction process for water extract.



Fig 5: Serbal extract.

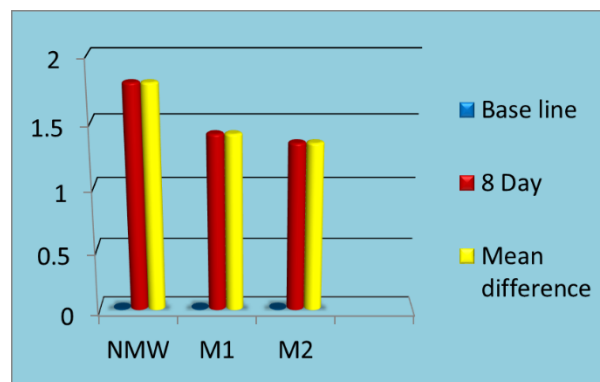


Fig 6: Plaque index.

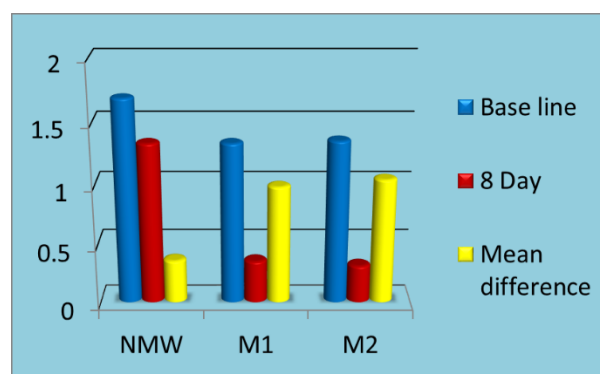


Fig 7: Gingival index.

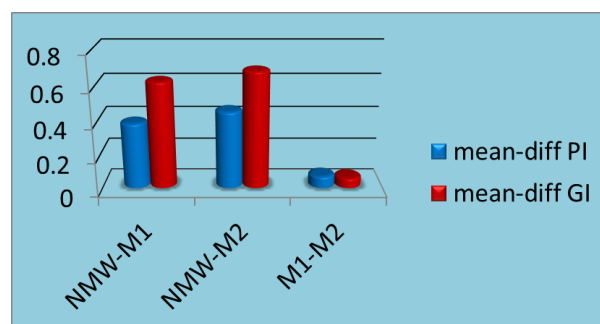


Fig 8: Inter group comparison.

AIM & OBJECTVES

- To assess clinically the potential of *Mimusops elengi* as antiplaque and anti gingivitis agent.
- To assess the efficacy of herbal preparation of *Mimusops elengi* on clinical parameters i.e. Plaque index (Turesky- Gilmore-Glickman Modification of Quigley-Hein, 1962),⁴ Gingival index (Loe and Sillness,1963).⁵
- To compare the efficacy of herbal extracts of *Mimusops elengi* with Listerine.



Fig 9: Clinical pictures for plaque index recording.

MATERIALS AND METHODOLOGY

SOURCE

The subjects for the study comprised of volunteers from MMCDSR, Mullana, Ambala. The volunteers were clearly explained about the study protocol & informed written consent duly signed by them was taken. The study was conducted as per Ayush Guidelines & Helsinki declaration (1964), revised in 2013.

INCLUSION CRITERIA

- Volunteers were of age group of 20-30 years.
- Both male and females participated in the study.
- Volunteers with generalized chronic gingivitis were chosen.
- No history of any dental therapeutic intervention.
- No history of use of any medication/ mouthwash in the last 30 days.
- Participants were co-operative, motivated and committed to participate in the study.

EXCLUSION CRITERIA

- Volunteers with any adverse oral habits like smoking, alcohol, tobacco chewing etc.
- Any known allergy/hypersensitivity to any product used in the study.
- Any known systemic disease.

Table 1: Wilcoxon signed ranks test.

PLAQUE INDEX				GINGIVAL INDEX		
	NMW	M 1	M 2	NMW	M 1	M 2
BASELINE	0.00	0.00	0.00	1.70±.143	1.30±.082	1.35±.108
8 TH DAY	1.80±.043	1.41±.024	1.30±.034	1.30±.082	.35±.076	.31±.073
MEAN DIFFERENCE	1.80±.043	1.41±.024	1.30±.034	.40±.178	.95±.105	1.04±.112
Z VALUE	-3.825	-3.839	-3.834	-3.829	-3.830	-3.827
P VALUE	<.001**	<.001**	<.001**	<.001**	<.001**	<.001**

Table 2: NPAR test (mann whitney test)

PLAQUE INDEX				GINGIVAL INDEX		
	MEAN DIFFERENCE	Z VALUE	P VALUE	MEAN DIFFERENCE	Z VALUE	P VALUE
NMW- M 1	.39±.011	-5.283	<.001**	-.55±.049	-5.279	<.001**
NMW- M2	.5±.011	-5.280	<.001**	-.64±.049	-5.277	<.001**
M1- M2	.11±.011	-4.694	<.001**	-.09±.049	-1.774	.076

STUDY DESIGN

The study comprised of 20 volunteers with generalized chronic gingivitis. It was designed as randomized, double blind cross over study. The participants were clearly explained about the study protocol.

Oral hygiene instructions given to the participants included

- A proper brushing technique
- Use of non-therapeutic, low- abrasive dentifrices and
- Use of soft toothbrush.

STUDY PROCEDURE

- The participants of the study were divided into an experimental phase and positive control phase randomly:
 - Experimental phase A: consisted of, rinsing with 10 ml of mouthwash containing herbal preparation of *Mimusops elengi* once daily for 30 seconds for 7 days.
 - Control phase B: consisted of, rinsing with 10 ml of Listerine mouthwash once daily for 30 seconds for 7 days.
- Each mouthwash was represented by a code, neither the examiner, nor the subject was aware of the code. This was done to maintain double blinding. The decoding of the mouthwashes was done after the completion of the study.
- During the first visit, all the volunteers were subjected to the assessment of clinical parameters. Then they were subjected to full mouth oral prophylaxis to minimize the existing gingivitis.
- The volunteers were then divided into different groups. They were instructed to rinse once daily under the supervision of examiner to ensure that good distribution of mouthwash in the oral cavity.
- Clear instructions were given not to rinse with water, eat or drink anything for 30 minutes following the use of mouth rinse.
- The first phase which constituted of 7 days mouthwash rinse was followed by a 14 days washout period. Then the participants were subjected to the second phase of 7days mouthwash rinse
- Pre and post values of clinical parameters were recorded and subjected to statistical analysis.

- The volunteer's compliance regarding all the mouthwashes was analysed in form of questionnaire.

PREPARATION OF AQUEOUS EXTRACT

A 200gm of *Mimusops elengi* Linn. bark material in the form of air shade dried powder was immersed in 600 ml of solvent. Aqueous extract was prepared by placing it in a vacuum evaporator at 30°C to remove the solvent. Then it was stored in a sterile bottle at 4°C.⁶

RESULTS

The study comprised of 20 participants which was completed in a period of 4 weeks. The plaque score were brought to zero prior to the beginning of the study and prior to each mouthwash phase. Plaque score was recorded at the end of each mouthwash phase i.e. at 8th day. Gingival index was measured at baseline and after 8th day of completion of each mouthwash phase. Significant difference in both the clinical parameters was observed in no mouthwash phase (NMW) as well as each of 2 mouthwashes phases (M1, M2) from the baseline to 8th day (table 1).

M2 was the positive control phase. The decoding of M1 and M2 was done by a third examiner, who was not involved in the clinical trial. M1 was the mouthwash prepared from the bark of *Mimusops elengi* while M2 was Listerine. Level of significance <.001%, was obtained by applying Wilcoxon signed ranks test. When NMW was compared with M1 and M2 by non parametric Mann-Whitney test, the plaque score and gingival index score were found to be highly reduced in all mouthwash phases. The highest difference was seen in M2 phase vs NMW (table 2). Gingival index score of M1 vs M2 was not significant (table 2), that gives the evidence that M1 mouthwash has almost equivalent results as that of Listerine.

DISCUSSION

Oral hygiene maintenance is an essential part of good periodontal health of an individual. In spite of availability of various chemical plaque inhibitors, the search for an efficacious antiplaque agent still continues. Commercially available chemical plaque control mouthwashes show

various side effects during long term use. Various herbal preparations in dentistry are well documented in oral hygiene maintenance. They contain natural agents called "phytochemicals" which are as effective as the chemical agents (sometimes show improvised results than chemicals).⁷ These phytochemicals show no side effects like staining of tooth, loss of taste sensation like commercially available mouthwashes. This clinical research was aimed to find a better adjunct which can be effective, economical and a better alternative.

Since ancient time, Bakul chaal or stem bark of *Mimusops elengi* linn. is used as an astringent to strengthen the teeth and gingiva. The root, bark and twig are used as "dantwan" to cleanse the teeth in rural parts of India.⁸ A mixture of bark with pepper, honey and ghee (*kawath*) forms a gargle which helps in reduction of gingival inflammation and improves the strength of the teeth. The root bark decoction when combined with milk and advised to be taken for three days in the morning is said to strengthen the teeth in aged individuals.⁹ "Mahakhadiradivati", a herbal preparation with *Mimusops* bark as main ingredient is indicated in treating swollen and inflamed gingiva, bad odour and stomatitis. The stem or bark has shown potent astringent, antimicrobial, antioxidant and anti-inflammatory property where as the fruit and seed extracts are less active, against gingival diseases and oral pathogens.¹⁰ There are some herbal preparations such as mouthwash and toothpastes (Vico- vajradanti®, Sudhanta®, Aloe dental cream®, Herboral® *kawath*, Mahakhadiradivati) which contain *Mimusops* as an active ingredient.^{11,12} Taking into consideration about the various properties of the *Mimusops*, we chose the bark part of this tree as the active agent to be evaluated for its mechanism of action as mouthwash in periodontal therapy. The aqueous extract of this *Mimusops* prepared for the study was pure water extract devoid of any additional preservatives, flavors or colors.

Herbal extract prepared from *Mimusops* was found almost as efficient as that of Listerine in anti-plaque and anti-gingivitis action. The probable cause of getting such positive results may be attributed to presence of different phytochemicals in stem bark of *Mimusops* which are *Mimusopsic*

acid, Mimosopic acid, Taraxerone, Betulinic acid, Gallic acid, Spinesterol and different types of Triterpene.

Akhtar N *et al* in 2010 reported a study to evaluate the anti-inflammatory effect of Lupeol triterpene *in vitro*, which reduced PGE2 production from macrophages and hence showed reduced edema.¹³ Triterpene not only reduced TNF- α and IL-1 β production but also inflammatory cell infiltrate at the site of inflammation. Anti-inflammatory and analgesic action of stem bark were studied by Purnima BC *et al* in 2001.¹⁴ Betulinic acid component of Herboral® and Sudhanta® exhibits astringent property.^{11,12} Various studies showed that stem bark derived phenolic compounds of the *Mimusops* have potent anti-oxidant property and antibacterial action. Rao KS *et al* in 2011 evaluated the free radical scavenging property of the chloroform extract of the plant.¹⁵

CONCLUSION

M. elengi Linn. has shown many medicinal as well as periodontal properties. It has also been found to be more effective against various species of oral pathogens. Despite these studies and its easy availability in the society, it has not been extensively used in periodontal field. Herbal mouthrinse derived from *Mimusops elengi* Linn. was found to be a potent plaque inhibitor and also showed anti-inflammatory actions against gingivitis. It was almost as effective as that of Listerine and can serve as good alternative for the society, being easily available and economic with no side effects. All the parts of the plant have been found useful with their medicinal value, but this plant should be explored more and further research work should be carried out in dental and periodontal field for new valuable and effective drug formulation, which will be easily available and economically more suitable to the majority of populations in southern Asiatic countries.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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