

## Development and stabilization of *ph* of pomegranate peel mouthwash in oral hygiene: an experimental study.

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### ABSTRACT

Oral hygiene is the key of one's healthy life. Maintenance of oral hygiene is directly related to body's first line defense mechanism. It maintains both oral as well as systemic health. Oral microflora plays very important role in maintenance of oral hygiene. Oral microbiome is a complex ecosystem of several species of micro-organisms such as streptococci, *Neisseria*, *Veillonella*, *Actinomyces* and other obligate anaerobes. This microbiome mainly affects by acidic diet and acidic environment of oral cavity. Poor oral hygiene decreases the rate of survival of oral microbiome and causes dental caries, periodontal diseases, halitosis oral pain & discomfort. Globally, prevalence of oral diseases increasing Burdon on health sector and economic sector. It is estimated that oral diseases affect nearly 3.5 billion people. It generally affects poor and socially disadvantaged members of society. Therefore, it is necessary to develop mouthwash in order

to maintain oral hygiene through Ayurveda procedures. It is developed by using Pomegranate peel powder by maintaining it's *ph*. Further it is analyzed for its organoleptic property to standardize the principles and processes of Ayurveda. On the basis of these properties it is seems to be effective in maintenance of oral hygiene and can reduce the chances of oral disorders. This method of preparation of mouthwash is too easy and can be used by every socio-economic status of society without any complication. So, it is strong appeal to use this method of development of mouthwash to maintain oral hygiene.

### KEYWORDS:

Oral hygiene, Oral *microflora*, pH, Pomegranate pee powder, Mouthwash, Gargle, Organoleptic property

### INTRODUCTION:

Oral cavity is a special organ of our body. It is important for eating, drinking,

breath, speech, communication and immune response. Also, it is the entry point to digestive and respiratory tracts. It provides body's first and natural defense mechanism against various micro-organisms.

Hence, oral health is essential for total health & satisfactory quality of life as it offers clues about overall health. According to WHO (2012), oral health is defined as a state of being free of mouth from facial pain, oral infections, oral sores and other diseases that limit individual's capacity in biting, chewing, smiling, speaking, and psychological well-being. <sup>(1)</sup> Therefore, Routine oral health check up is important, but only an estimated 44.5% of people obtain professional health care on a regular basis. <sup>(2,3)</sup>

Oral disorders are among the most prevalent diseases globally, and have serious health and economic burden. Although oral diseases are largely preventable, children living in poverty, socially marginalized group and older people are most affected by oral diseases and have poor access to dental care. It is estimated that oral diseases affect nearly 3.5 billion people. <sup>(4)</sup>

Oral health can be maintained by proper oral hygiene. Oral hygiene means the practice of keeping mouth and teeth healthy and clean by regular brushing, flossing and tongue scrapping to prevent from bad odor and dental problems. Clinical studies have shown that people with poor oral hygiene are at increased risk of developing various oral health problems. Poor oral hygiene is directly responsible for increased incidence of dental caries, periodontal diseases, halitosis oral pain & discomfort. <sup>(2)</sup>

Oral microbiome is the principle factor in maintaining both oral and systemic health. It is a complex ecosystem where several species of microorganisms are present. It has been found that around 700 species of bacteria are found in oral cavity. The predominant group of bacteria present in oral cavity include streptococci, Neisseria, Veillonella, Actinomyces and other obligate anaerobes. <sup>(5)</sup> These microorganisms are present on mucosal surfaces of tongue, buccal mucosa, tooth surfaces, gingival crevices. The oral microbial flora plays a very important role in normal development of the host's defense mechanism and prevents colonization of exogenous organisms. <sup>(6)</sup>

The pH of oral cavity is 6.35 to 6.85. <sup>(7)</sup> This neutral pH and proper oral hygiene are essential for growth of oral microflora. Acidic diet drops the pH of oral cavity around 5.0. This drop in pH is lethal for bacteria and cause damage to tooth enamel. On the other hand, poor oral hygiene disturbs the function of oral microflora which leads to gingivitis, periodontal diseases and dental cavities. <sup>(8)</sup> In addition, poor oral hygiene has been linked to conditions like osteoporosis, diabetes and cardiovascular diseases. <sup>(9)</sup>

There are so many clinical entities related with oral cavity. Out of this, *Gilayu* (Tonsillitis) is the frequently occurring disease in any age group. Etiologically, it is caused by the vitiated *Kapha* and *Rakta Doshas*. <sup>(10)</sup> Prevalence of tonsillitis between age group 11-20 year is 56% and 21-30 year is 20%. <sup>(11)</sup> However, it is seen that 15% of all visit to the family doctor are due to chronic Tonsillitis. <sup>(12)</sup>

The causative organisms of Tonsillitis are Staphylococcus, Hemophilus influenza, Diphtheroid, etc. But, 90% of this is caused by Streptococcus Pneumoniae (beta hemolytic streptococci) which is a lactobacillus. Poor oral hygiene is one of the predisposing factor for occurrence of Tonsillitis. <sup>(13, 14)</sup>

In our circumstances, we see that mouthwashes are prescribed very oftenly by every Dentist and ENT specialist, in order to maintain oral hygiene and to treat oral disorders. But, side effects of mouthwash are also very common, such as taste disturbance, tooth staining, sensation of dry mouth, etc. Alcohol containing mouthwashes may make dry mouth and halitosis worse as it dries out the mouth. <sup>(15, 16)</sup>

Ayurveda is one of the most ancient system of medicine. Its primary aim is to prevent occurrence of disease. There are several procedures described in Ayurveda classical text in order to maintain oral hygiene such as *Kavalagraha* (oil pulling), *Gandusha* (Oil pulling), *Nasya* (Administration of medicine through the nose), *Dhumpana* (Inhalation of smoke through nose), *Pratisarana* (Application of paste or powder of drug into mouth), etc. In this *Kavalagraha* is mainly related to oral hygiene and oral disorders.

Pomegranate peel is an herbal drug, have *Kashaya Rasa*, *Anushna Virya*, *Madhura Vipaka* which are exactly opposite to *Doshic* configuration of *Gilayu* (Tonsillitis). <sup>(17)</sup> It is cheap and easily available to all people. This is the best out of waste material. Therefore, Pomegranate peel mouthwash should be developed to increase its worldwide acceptability by stabilizing its pH.

Hence, with the intention of development and stabilization of pH of Pomegranate Peel mouthwash, standard manufacturing processes were carried out to avoid complications of formulation.

## MATERIAL AND METHOD

### Procurement of raw materials

To develop and stabilize the pH of Pomegranate Peel Mouthwash, raw drug was identified and collected in fruit ripening season <sup>(18)</sup> under the guidance of *Dravyaguna* department of our institute. After cleaning, drug was dried properly and powdered under observation of *Rasashastra & Bhaishajya Kalpana* department of our Institute. That powder was stored in air tight container with label for further procedures.

### Preparation of mouthwash

The Mouthwash was prepared as per *Bhaishajya Ratnawali*. 1 *Karsha* (10gm) of Pomegranate Peel powder was mixed with 1 *Prastha* (640ml) water and boiled it in a slow flame till half of the mixture was remain. Then mixture was filtered with cotton cloth <sup>(19)</sup> and analyzed for organoleptic property. (Table 1)

The mouthwash prepared as per above method was astringent in taste having 2.50 pH, i.e. acidic medium. Due to this, it becomes difficult to do *kavalagraha* (Gargle) as it causes loss of taste for short duration and acidic pH is harmful for oral microflora.

To avoid this complication of our formulation, some samples of mouthwash were prepared with different concentration of Pomegranate Peel with

water. In this procedure, the quantity of water was maintained as 100 ml and quantity of pomegranate peel powder was changed in every sample.

The samples were prepared by mixing different concentration of Pomegranate Peel powder with water in sterile beaker. Boiled this mixture in a slow flame for 10 min. Filtered it with cotton cloth and labelled them as sample 1, sample 2.....sample 8. Now, samples were analyzed for organoleptic property. (Table 2)

As we seen that, there were not any remarkable changes in organoleptic property of mouthwash, Turmeric powder was mixed with pomegranate peel powder. Turmeric is the famous of Pomegranate Peel Mouthwash

**Table1: Showing organoleptic property**

Property	Characteristic
Aspect	Coloured liquid
Colour	Brown
Smell	Characteristic smell of dried Pomegranate peel
Taste	Astringent
pH	2.50

The Mouthwash prepared by mixing different concentration of Pomegranate Peel powder and water (sample 1, sample 2.....sample8) show slight changes in taste. Taste becomes slightly astringent but, the other properties (aspect, colour, smell) remain same. Also, it shown drastic changes in pH level with every sample.

**Table 2: Showing pH of different concentrations of Pomegranate Peel Mouthwash**

Sr. No.	Pomegranate Peel powder (in gm)	Water (in ml)	pH
Sample 1	1	100	3.58
Sample 2	2	100	3.91
Sample 3	3	100	3.69
Sample 4	4	100	3.55
Sample 5	5	100	3.61
Sample 6	6	100	3.56
Sample 7	1	200	5.01
Sample 8	1	300	5.08

antibiotic, practice daily in Indian kitchen and easily available in all parts of country. Then again sample 9 and sample 10 were prepared with different concentration of Pomegranate Peel powder and Turmeric powder with water by the same procedure and analyzed for organoleptic property. (Table 3, 4)

#### Instrument

Organoleptic property such as Aspect, Colour, Smell, Taste were analyzed by simple observation and to check the pH, "Equiptronic digital pH meter, Model EQ 610 was used by the process of pH metery".

#### RESULT

Now, Mouthwash prepared by mixing Pomegranate Peel and Turmeric powder with water again shows changes in its organoleptic property.

Table 3: Showing Organoleptic property of Pomegranate Peel and Turmeric Mouthwash

Property	Characteristic
Aspect	Coloured liquid
Colour	Yellow-Brown
Smell	Characteristic smell of Turmeric and dried Pomegranate peel
Taste	Bitter-Astringent

Table 4: Showing pH of Pomegranate Peeland Turmeric Mouthwash

Sr. No.	Pomegranate Peelpowder (in gm)	Turmeric powder (in gm)	Water (in ml)	PH
Sample 9	1	0.5	100	5.10
Sample 10	1	1	100	5.60

## DISCUSSION

Mouthwash prepared as per *Bhaishajya Ratnawali* is very astringent in taste. It is seen that; on gargle it causes heaviness of tongue and loss of taste sensation for short duration. Also, Acidic medium (pH less than 5) is harmful for Dental plaque bacteria which destructs tooth enamel.

Beside this method of preparation of Mouthwash, no any other specific method available on our classical text to prepare a solution of drugs for *Kavalagraha*. Therefore, Mouthwash was analyzed technically by its organoleptic property mainly by pH.

Hence, Mouthwash was prepared by taking different concentration of Pomegranate Peel powder with water and analyzed. It is seen that pH is not increasing more than 5.0. In earlier studies; it is proved that Turmeric have antimicrobial property and it has been practicing for gargle from many years in our country. Hence, Turmeric powder added to prepare Mouthwash.

Oral diseases disproportionately affect the poor and socially disadvantaged members of society. There is a very strong and consistent association between socio-economic status (income, occupation and educational level) and the prevalence and severity of oral diseases. Also, in many lower income and middle-income countries, oral diseases remain largely untreated because of its cost effect. This imposes a large economic burden to families and health care system.

The drugs used to prepare mouthwash are Pomegranate Peel and Turmeric. In this, Pomegranate Peel is easily available in any part of country and is a waste product with medical property and Turmeric is a kitchen remedy. Both the drugs are cost effective and can be used by people of any socio-economic status.

According to Ayurveda, *Gilayu* (Tonsillitis) is caused by Vitiated *Kapha* and *Rakta Doshas*. Pomegranate Peel and Turmeric have *Katu, Tikta* and *Kashaya*

Rasa which is *Kaphashamaka* and *Pittashamaka*, which exactly correlates with the a *Doshic* configuration of *Gilayu*.

#### CONCLUSION: -

Many samples of mouthwash were prepared with different combination of Pomegranate peel and Turmeric powder in different concentrations. Finally, we come to the conclusion that the best method for preparation of Pomegranate Peel mouthwash is

#### Requirements:

- Pomegranate Peel powder 1 gm
- Turmeric powder 1 gm
- Water 100 ml

Boil this mixture in slow flame for 10 min. and filter it with cotton cloth. This lukewarm solution should be use for *kavalagraha* (Gargle).

This Pomegranate Peel mouthwash will definitely give a better result without any complications. Hence, we should follow this procedure. So, I will strongly recommend this standard operating procedure of Pomegranate Peel mouthwash for gargle in maintaining oral hygiene and treatment of tonsillitis.

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*Conflict of Interest: Non*

*Source of funding: Nil*

*Cite this article:*

*"Development and stabilization of ph of pomegranate peel mouthwash in oral hygiene:*

*An experimental study."*

*Nikeeta Gupta, Sumeeta Jain, V. G. Patrikar*

*Ayurline: International Journal of Research In Indian Medicine 2020;4(4) : 01 – 07*