

Antimicrobial prophylactic activity of pomegranate juice on oral bacteria as a pre-procedural rinse

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ABSTRACT

Aim: The aim of this study was to determine the antimicrobial prophylactic activity of pomegranate juice as a preprocedural rinse. **Objective:** The study was done to analyze whether pomegranate provided prophylaxis in reducing the bacterial load when compared to the gold standard chlorhexidine mouthwash as a pre-procedural rinse. **Background:** The growing resistance to various antibiotics has lead scientists to look for newer medications. As fruits are a part of our daily diet, evaluating their medicinal and prophylactic properties has gained momentum. Fruits such as pomegranate, guava, and apple have an inhibitory effect on the oral bacterial flora. **Materials and Methods:** The study was done by dividing the patients undergoing scaling treatment into two groups, namely A and B. A was the control group which was advised on chlorhexidine mouthwash before the procedure, whereas B was the study group who were advised to rinse with pomegranate juice. Salivary samples were collected pre and post of the mouth rise, and culture was prepared from these samples. The colony-forming units were counted and the comparison was made. The study was done using simple methods of evaluation for better understanding of the prophylactic activity of pomegranate.

KEY WORDS: Antimicrobial activity, Fruit juices, Oral bacteria, Prophylaxis

INTRODUCTION

Dental surgeons and other oral health-care providers such as dental hygienist and dental assistants are exposed to a wide range of microorganism such as bacteria, protozoan, virus through their daily routine when treating the patients. In the absence of proper infection control techniques and preventive methods, the risk of the health-care professionals being vulnerable to the pathogenic microbes from the patients increases. Mostly, the pathogen is transmitted from the patients through air and aerosols.^[1]

Introduction of ultrasonic vibration in dentistry elevated the levels of aerosols through treatments such as scaling. Many studies have proven that the aerosols are heavily contaminated with bacterial and pathogenic microorganisms. Hence, health-care professionals use

various techniques such as pre-procedural mouth rinse and chemical mouth rinse to safeguard themselves and to reduce the aerosols which is born out of the treatment given to the patient.^[2]

Pre-procedural mouth rinse is a procedure done before the treatment where the patient is given a chemical mouthwash such as 0.2% chlorhexidine to reduce the number of microbes in the patient's mouth.^[3] This procedure is done to keep the bacterial levels low through the appointment and to decrease the chances of surgeon from acquiring infections through aerosols and reduce the contamination of the clinic environment.

There are various chemical mouthwashes used in dentistry, while chlorhexidine which is administered to the patient as oral rinse solution is the gold standard used in dentistry due to its increased time of action in mouth and better bactericidal efficiency when compared with other chemical mouthwashes, and chlorhexidine has very limited adverse effects when compared to other chemical mouthwashes.^[4]

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Punica granatum L. is commonly known as pomegranate which is found to be originated from India and Iran. It possesses various medicinal properties such as anti-inflammatory property and antimicrobial property which are of immense use in dentistry. Since it is a natural product it has no side effects and was proven to decrease the microbial load in the oral cavity, as it contains polyphenols, tannins, and ellagic acid anthocyanins such as delphinidins and cyanidins. These inhibit the formation of tartar by obstructing the activity of microorganism that causes them. The tannins present in the pomegranate can cross the cell wall and form complexes of higher molecular weight to disrupt the proteoglycan synthesis need for adherence to tooth structure and also increase the bacterial lysis.^[5]

The aim of our current study was to analyze the efficiency of pomegranate juice as a pre-procedural mouth rinse and compare with 2% chlorhexidine mouthwash.

MATERIALS AND METHODS

Preparation of fresh fruit juices: The fresh pomegranate fruit that approximately weighed 300 g was purchased from the local market and was then thoroughly washed with water and dried at room temperature. The outer skin was removed and the inner pulp of pomegranate was beaten. The fruit was crushed in the grinder along with 350 ml of drinking water and the pulp was extracted. Fresh fruit juice was obtained which was autoclaved at 15 pounds pressure for 20 min and stored in sterile container.

Twenty patients attending the dental Outpatient Department Of Periodontia, Saveetha Dental College and Hospitals, Chennai, for the scaling treatment were selected and were equally grouped into two groups. One group of patients was given 2% chlorhexidine mouthwash, and the other group was given freshly prepared pomegranate juice as a mouthwash.

Salivary sample was collected from the patients before the rinse with pomegranate juice as pre-rinse sample to evaluate the bacterial load.

75 ml of the prepared fresh juice was given to these patients and were asked to rinse for 2 min. Then, the salivary samples were collected after 15 min in sterile containers from these patients as a post rinse sample.

Group two patients were given 10 ml of 2% chlorhexidine mouthwash and salivary samples were collected similarly before and after the mouth rinse.

All the salivary samples were stored in the refrigerator until it was been processed. The salivary samples were diluted with sterile saline at the ratio of 1:80. From the diluted saliva, 10 ul was pipetted using sterile tips fitted to micropipette and was transferred

to brain heart infusion agar. The culture plates were then incubated for 24 h at 37°C aerobically before evaluation. After the incubation, the plates were taken and the colony-forming units were counted and the values were tabulated.

RESULTS

The total colony-forming unit compared with the salivary samples collected before and after the mouth rinse in the two groups were tabulated [Tables 1-3].

The mean value of the colony-forming unit before and after the mouth rinses was compared. It shows that, using chlorhexidine, there is a reduction of nearly 70% in the total colony-forming unit. In the pomegranate used group, there is a reduction of 51% in the total colony forming unit.

DISCUSSION

0.2% chlorhexidine is used as a gold standard in all dental prophylaxis. It has many unfavorable effects apparent from the beneficial effect of antimicrobial activity. In search of alternate agents, many products, commercially available, were tested by previous authors.

Table 1: Comparison of the colony-forming units of pre- and post-rinse of Group 1 using pomegranate mouthwash

Sample	Pre-rinse colony-forming units	Post-rinse colony-forming units
1	13.520	6960
2	13.840	6320
3	12.160	7280
4	7440	3760
5	4560	3120
6	14.000	6240
7	14.400	7280
8	11.600	4960
9	7840	3600
10	6080	2720

Table 2: Comparison of the colony-forming units of pre- and post-rinse of Group 2 using 0.2% chlorhexidine mouthwash

Sample	Pre-rinse colony-forming units	Post-rinse colony-forming units
1	28.160	0
2	20.000	0
3	15.040	280
4	23,200	700
5	24.320	1360
6	15.520	2040
7	16.480	600
8	16.960	560
9	34.080	720
10	22.080	1840

Table 3: Comparison of the mean colony-forming units of pre- and post-rinse of Group 1 and Group 2

Samples	Pre-rinse colony-forming units	Post-rinse colony-forming units	Percentage reduction of colony-forming units
Pomegranate mouthwash	10560	5224	51.1%
0.2% chlorhexidine mouthwash	21548	6444	71.3

Many herbal products were also available in the market which contains herbal extracts mixed with chemicals. According to Yogeshwari *et al.*, the effect of herbal mouthwash is not equal to chlorhexidine. In our study with pure pomegranate extract, the effect is comparable with 0.2% chlorhexidine which is commercially available for oral prophylaxis. A study done by Kritivasan *et al.* pomegranate has shown very good antimicrobial activity against *Streptococcus mutans*, *Lactobacilli*, and *Enterococcus* in *in vitro* conditions.^[6,7]

Pomegranate is a fruit which is normally consumed in our day to day life. It is proved that the vital compounds and active ingredients present in pomegranate have a lot of health benefits in general. There are many studies that prove the generalized effects of *P. granatum* L. on the systemic health of the humans. It proved to have antiparasitic, anti-inflammatory, and antimicrobial activity.^[8,9] There were few studies which focus on the localized effect of oral activity. Sahana *et al.* concluded that pomegranate was proven to be very effective against oral bacteria such as *S. mutans*, *Streptococcus aureus*, and *Lactobacillus*.

Even though there are many mouthwashes available in the market, chlorhexidine proves to be the gold standard till date because of the efficiency and safety of the use of the mouthwash. The efficiency of the mouthwash is proved by many literatures; they stated that the efficiency of the chlorhexidine will be prevail for 8 h and keep the mouth free of bacteria. This efficiency is greater when compared to other.^[10]

Various factors would have altered the results of the study, such as the bacterial profile of the patient, dietary style of the patient, and immunity of the patient.

Bacterial profile of the patient can greatly influence the results of the study as the bacteria present in the oral cavity of all patients are not the same. In our current study, pre-operative bacterial count was also considered so that this factor could have not influenced the results of the study.

Dietary style of the patient is a very important factor which could have influenced the results of the study as the amount of sugar present in the oral cavity due to the breakdown of food into simple sugar increases the microbial count of the bacteria. This factor could have influenced the study since the patients were randomly selected for the study, and the dietary style would have not influenced the results of the study.

The immunity of the patient would have greatly influenced the microbial count of the oral cavity which could have altered the results of the study. However, patients with systemic diseases and immunocompromised patients were excluded from the study. Hence, this factor could not have influenced the results of this study.

CONCLUSION

From this study, it is documented that pomegranate is comparatively beneficial in patients attending dental clinics for various treatments as a pre-procedural rinse. It is also biocompatible without any unfavorable effects on the body. Hence, it can be considered as an effective alternative mouthwash in oral prophylaxis methodologies.

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