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PASSION FRUIT: A FETCHED PASSION FOR DENTISTS

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ABSTRACT

Objective: Dental caries is a common oral infection prevalent in developing countries. Streptococcus mutans, a commensal bacterium of the oral cavity, plays a major role in the etiology of caries and root canal infection. Sodium hypochlorite and Chlorhexidine are used in the prevention of caries and as root canal medicament though they cannot be used in combination.

Study Design: Different concentrations of passion fruit pulp extract were evaluated to measure the most effective way against Streptococcus mutans. For this bacterial inhibition zones were measured for each concentration in millimeter and compared.

Results: The most effective concentration of passion fruit pulp extract was 40% to 45% against Streptococcus mutans.

Conclusion: The present study aimed to evaluate alternative, inexpensive, good in taste, simple and effective method for sanitization of tooth cavity as well as root canal system. The antimicrobial efficacy of passion fruit pulp extract as irrigant and cavity disinfectant is evaluated and compared with the standard irrigant sodium hypochlorite.

INTRODUCTION: Undoubtedly medicinal plants are relevant in both developing and developed nations of the world as sources of drugs or herbal extracts for various chemotherapeutic purposes. Also the use of plant derived natural compounds as part of herbal preparations used as alternative sources of medicaments continues to play major roles in the general wellness of people all over the world [1].

In addition to their delicious taste and refreshing flavor and aroma, fruits add important vitamins, minerals, and other bioactive compounds to the human diet [2].

Many recent studies have demonstrated antimicrobial activity against selected oral pathogens from natural sources [3].

Role of bacteria and their byproducts in the pathogenesis of pulp and periodontium is well documented. Main challenge during root canal therapy would be to maintain asepsis in vital pulp cases and antisepsis in non-vital pulp cases [4].

Dental plaque, a film of microorganisms on the tooth surface, plays an important part in the development of caries and periodontal diseases [3].

In recent years, human pathogenic microorganisms have developed resistance in response to the indiscriminate use of commercial antimicrobial drugs commonly employed in the treatment of infectious diseases.

This situation, the undesirable side effect of certain antibiotics, and the emergence of previously uncommon infections, has forced scientists to look for new antimicrobial substances from various sources, such as medicinal plants. The screening of plant extracts and plant products for antimicrobial activity has shown that plants represent a potential source of new anti-infective agents [5].

P. edulis Sims (Passion fruit) belongs to the genus Passiflora, comprising about 500 species that are distributed in warm temperatures and tropical regions. The passion fruit prefers subtropical and frost free environment [1].

Primarily two fruit types are commercially produced, yellow and purple, and both are commonly consumed throughout the world. Yellow passion fruits are thought to be hybrids of purple varieties and are most commonly used for processed juices due to their more acidic taste and higher juice yield [6]. Passion fruit juice is a good source of ascorbic acid (vitamin C) and carotenoids (vitamin A) [7].

Little research has been conducted on the health benefits of passion fruit, especially its anticancer properties. Certain non-nutritive phytochemicals, carotenoids and polyphenols present in passion fruit, have been found to inhibit cell proliferation in leukemia and induce apoptosis [8]. It is believed that its antioxidant properties may aid in reducing the wheezing, and the flavonoids can actually help reduce allergic reactions and inflammation [9,1].

The present study was undertaken to investigate the antimicrobial activity of the passion fruit juice against Streptococcus mutans in vitro.

MATERIALS AND METHODS:

Materials: The concentrated passion fruit juice (**Fig. 1**) was collected from shimla hills offerings pvt ltd, Himachal Pradesh, India and identified by an agriculturist and the vendor according to their color and scent. Strains of Streptococcus mutans were collected from IMTECH Chandigarh.

FIG. 1: PASSION FRUIT PULP EXTRACT

Extract preparation:

Distilled water extract: The concentrated passion fruit juice was mixed with distilled water in different concentration in a measurement jar and made up to 10%, 20%, 30%, 35%, 40%, 45%, 50%, 60%, 80% by volume in a measurement cylinder.

Phosphate buffer saline extract: The concentrated passion fruit juice was mixed with phosphate buffer saline in different concentration in a measurement jar and made up to 10%, 20%, 30%, 35%, 40%, 45%, 50%, 60%, 80% by volume in a measurement cylinder.

Microbial cultures: Fresh samples of Streptococcus mutans were prepared for culture and the growth of *S. mutans* were checked by turbidity and matching it with McFarland standard solution to check the inoculum density for the antimicrobial susceptibility test.

Agar plates: Brain heart infusion was prepared (**Fig. 2**) and made ready in six plates for antimicrobial test

FIG. 2: BHI AND AGAR AGAR PREPARED FOR THE TEST

Method: A modified agar diffusion method was used to determine antimicrobial activity. Nutrient agar was inoculated with a microbial cell suspension (200 µl in 20 ml of medium) and poured into sterile petri dishes and allowed to set [5]. Streptococcus mutans culture was spread on the agar plates. Five wells of 6mm diameter were punched in each plate. Each well was sealed at the bottom with 5 µl of agar for better diffusion of the extract.

Passion fruit pulp extract 40%, 60%, 80%, sodium hypochlorite and control PBS were added in respective wells and the first plate was kept in incubator. Same procedure was done with10%, 20%, 30% and 40% of passion fruit pulp extract, sodium hypochlorite and control PBS and this second plate was kept in incubator. 30%, 35%, 40%, 45%, 50% of pulp extract, Sodium hypochlorite and control PBS were added in respective wells of third agar plate and kept in incubator . Same procedure was repeated with distilled water as control instead of PBS in the same sequence with the remaining three agar plates and and kept in incubator (**Fig. 3**)

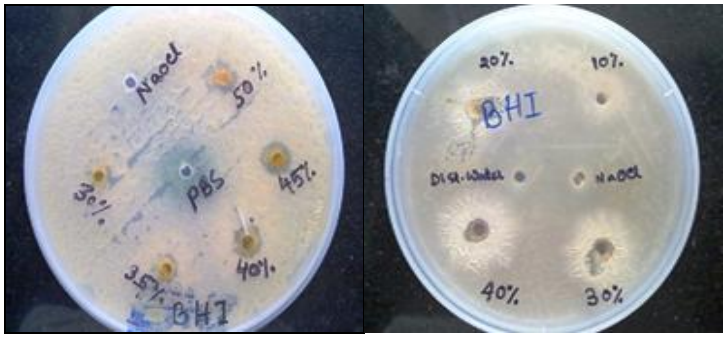

FIG 3: DIFFERENT CONCENTRATION OF PASSION FRUIT PULP EXTRACT AND ZONE OF INHIBITION

Incubation: All the culture plates were kept in the incubator at 38.8°C for 24 hours. After incubation culture plates were removed and zones of inhibition were recorded (**Fig. 4**).

FIG. 4: INCUBATION DONE

Measurement: The zone of inhibition was observed visually around the punched wells. The experiment was performed 3 times and mean of the zone of inhibition was recorded in mm [10] (**Table 1**) .

Results: The present study was conducted to investigate the antimicrobial activity of passion fruit juice concentration. The 10% and 20% passion fruit juice in distilled water and PBS extract didn't show any inhibition zone where 30% passion fruit juice in PBS started showing inhibition zone of 7mm. 35% of juice concentration showed inhibition zone of 8 mm diameter in PBS and 7mm diameter in distilled water.

40% to 45% concentration showed best zone of inhibition in PBS, After that zone of inhibition decreased with increased concentration of the passion fruit juice. Results were tabulated (Table 1).

TABLE 1: ZONES OF INHIBITION IN MILLIMETER

Conc of Passion fruit pulp Extract (%)	PBS Extract (mm)	Distilled Water Extract (mm)	Sodium Hypochlorite (2.5%)(mm)
10	0	0	6
20	0	0	6
30	7	0	6
35	8	7	6
40	10	8	6
45	9	7	6
50	9	5	6
60	8	5	6
80	7	5	6

DISCUSSION: Several studies on the antimicrobial activity of irrigation solutions in endodontics, such as 0.5%,1%, 2.5%, 5% NaOCl and 2% CHX are found in literature [9].

Inclusion of *S. mutans* in this study was based on the literature that relates this micro organism to pulp infections and dental caries [10].

Use of passion fruit as an endodontic irrigant might be advantageous because it is a biocompatible antioxidant and thus not likely to cause the severe injuries to patients that might occur with NaOCl .The better taste and aroma also give this fruit an advantage over other herbal irrigants.

The use of best possible irrigant during chemo-mechanical preparation is of great importance. Ideal irrigant should have antimicrobial action and the capacity to dissolve organic and inorganic remnants. NaOCl in full concentration is well known for its bactericidal action and cytotoxicity [9, 11].

Though passion fruit has several advantages, it does not have tissue dissolving capacity. Literature states that chlorehexidine can't be used in combination with sodium hypochlorite because of formation of para-chloroaniline, which is cytotoxic and occludes dentinal tubules [12,13]. Moreover antibacterial effect of Passiflora group against *E. faecalis* is already proven [14].

So passion fruit pulp extract can be used along with sodium hypochlorite which does not have any harmful effect like chlorehexidine. The results obtained in this *in vitro* study showed that passion fruit pulp extract is a viable medicament against *S. mutans*. As 3% NaOCl showed comparatively less antimicrobial effect than passion fruit pulp extract of particular concentration of 40% to 50%, passion fruit pulp has the potential to be used as important intracanal medicament in conjugation with Sodium hypochlorite in root canal disinfection [10].

CONCLUSION: Under the limitations of this study, it was concluded that passion fruit pulp extract has a significant antimicrobial effect against S.mutans. Microbial inhibition potential of passion fruit pulp extract observed in this study opens perspectives for its use as an intracanal medication and cavity disinfectant. However, preclinical and clinical trials are needed to evaluate biocompatibility & safety before passion fruit pulp extract can conclusively be recommended as an intracanal irrigating solution, but in vitro observation of passion fruit effectiveness appears promising.

As the global scenario is now changing towards the use of non toxic plant products those have traditional medicinal use, extensive research and developmental work therefore should be undertaken on passion fruit and its products for their better economic and therapeutic utilization.

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REFERENCES:

1. Ripa FA, Haque M, Nahar L et al: Antibacterial, Cytotoxic and Antioxidant Activity of *Passiflora Edulis Sims.* Europian journal of scientific research 2009; 31(4): 592-598.
2. Fernandes AG, Santos GM, Silva DS et al: Chemical and physicochemical characteristics changes during passion fruit juice processing. Ciênc. Tecnol. Aliment, Campinas 2011; 31(3): 747-751.
3. Selvan A , Singh.RC, and Prabhu T, antibacterial activity of bee propolis against clinical strains of streptococcus mutans and Synergism with chlorhexidine, international journal of pharmaceutical studies and research, vol. II/ issue i/january- march, 2011/85-90.
4. Samadi N, Zaree R, Bakhtiar H, Salehnia AN: Comparative antibacterial efficacy of endemic *Satureja Khuzistanica* Jamzad essential oil, Sodium Hypochlorite and Chlorhexidine Gluconate solutions as root canal irrigations. Dent Res J 2011; 8(1): 28-32.
5. Firas A. Al-bayati, Khudir D, Sulaiman: *In Vitro* Antimicrobial Activity of Salvadora persica L. Extracts against some Isolated Oral Pathogens in Iraq. Turk J Biol 2008; 32: 57-62.
6. Stephen T. Talcott, Susan s, Percival et al: Phytochemical Composition and Antioxidant Stability of Fortified Yellow Passion Fruit (*Passiflora edulis*), Department of Food Science and Human Nutrition, University of Florida, P.O. Box 110370, Gainesville, Florida 32611-0370.
7. Knight RJ, Sauls JW: The Passion Fruit http://edis.ifas.ufl.edu.
8. Neira CM: The effects of yellow passion fruit, Passiflora Edulis Flavicarpa, phytochemicals on cell cycle arrest and apoptosis of leukemia lymphoma molt-4 cell line, a thesis presented to the graduate school of the university of florida in partial fulfillment of the requirements for the degree of master of science university of florida 2003.
9. Ayhan H, Sultan N, Cirak M, Ruhi M, Bodur H: Antimicrobial effects of various endodontic medicaments on selected microorganisms. Int Endod J 1999; 32:99-102.
10. Bohora A, Hegde V, Kokate S: Comparison of the antibacterial efficiency of neem leaf extract and 2% sodium hypochlorite against E. faecalis, C. albicans and mixed culture - An in vitro study. Endodontology.
11. Gernhardt CR, Eppendorf K, Kozlowski A, et al, Toxicity of concentrated sodium hypochlorite used as an endodontic irrigant. Int Endod Journal 2004; 37: 272-280.
12. Krishnamurthy S, Sudhakaran S: Evaluation and Prevention of the Precipitate Formed on Interaction between Sodium Hypochlorite and Chlorhexidine. Journal of Endodontics 2010; 36:1154–1157.
13. Bettina R. Basrani, Manek S, Sodhi RNS, Fillery E, Manzur A: Interaction between Sodium Hypochlorite and Chlorhexidine Gluconate. J Endod 2007; 33: 966 –969.
14. Kannan S, Parimala B, Jayakar B: *In-vitro* antibacterial activity of various extracts on the leaves ofnPassiflora mollissima. J. Chem. Pharm. Res 2010; 2(5): 225-228.

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