



CLINICAL EVALUATION OF 2% WHITE TEA EXTRACT USED AS AN COOLANT SOLUTION DURING ULTRASONIC SCALING: A RANDOMIZED CONTROLLED TRIAL.

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ABSTRACT **Introduction:** White tea (camellia sinensis), is an organic tea well known for its effects such as anti-inflammatory, anti-bacterial and anti-oxidative actions. The main rationale for performing subgingival irrigation is to reduce microbiota quantitatively. **Aim:** To evaluate the effectiveness of white tea extract used as an irrigant during oral prophylaxis in patients with chronic gingivitis. **Methodology:** 30 systemically healthy patients were randomly divided into test and control groups each containing 15 patients. In the test group, SRP was performed using white tea extract + distilled water as the irrigant and in the control group, SRP was done with distilled water as the irrigating solution. Clinical parameters like salivary pH change were recorded before SRP and after SRP, PI and GI were recorded at baseline, 7th day, and 14th day. **Results:** Both intragroup and intergroup comparisons showed statistically significant differences for both GI and PI ($p < 0.001$). Also, salivary pH showed a statistically significant increase in the test group. **Conclusion:** White tea extract showed promising potential as an irrigating agent used during scaling.

KEYWORDS :

INTRODUCTION

Tea has a long and rich history, with the first references dating back over 5,000 years. Tea is made from the leaves of *Camellia sinensis*, a plant from the Theaceae family that is grown in over 30 countries across the world.[1]

White tea (WT) is made from very young tea leaves or buds with small silvery hairs that are only collected once a year in early spring. During growth, the buds may be sheltered from sunlight to inhibit chlorophyll development, giving the early leaves a white look.[2]

Tea contains several bioactive compounds that have been shown to have a wide range of physiological properties, including stimulant and antidepressant properties, anti-inflammatory, antioxidant, anti-infectious diseases, antimutagenic, anticarcinogenic, and anticancer promoting antimicrobial, hypolipidemic, hypocholesterolemic, neuroprotective, and antidiabetic agents, as well as improving immune responses.[3] Tea leaves are the most prevalent source of polyphenols, which have antibacterial properties against Gram-positive and Gram-negative bacteria. Tea leaf extract's antibacterial effects against cariogenic bacteria have also been thoroughly investigated.[4]

Hence, this study was designed to evaluate the efficacy of white tea extract used as an irrigating solution (coolant) during ultrasonic scaling.

MATERIALS AND METHOD

Preparation Of White Tea Extract

Dried WT leaves (Teamonk Kimaya® USDA Certified Organic Darjeeling White Tea Leaves Box) were purchased from the market. In a 1000ml sterile beaker, 50g of the weighted leaves were steeped for 48 hours in 500ml distilled water. The extract of the WT leaves was filtered using Whatman filter paper No 1. The filtrates were then concentrated and kept at 1.6 C until they were needed. This extract was then added to the distilled water as a coolant solution at a 2% concentration for scaling and root planing.

Study Design

30 systemically healthy patients satisfying the inclusion and exclusion criteria were included in this randomized controlled study. The study was approved by the ethical committee of Pacific Dental College and Hospital, Debari. Inclusion criteria were as follows: Age range of 20-50 years and patients with moderate to severe chronic gingivitis. Exclusion criteria for this study were: patients having systemic

diseases, pregnant and lactating females, smokers and tobacco chewers and patients undergoing anti-microbial therapy. 30 patients were randomly divided into two groups using the coin-toss method.

Test group: SRP using distilled water + 2% WT extract as coolant

Control group: SRP using distilled water as coolant.

Ultrasonic scaling was done using Woodpecker® Dental Ultrasonic Piezo Scaler. Verbal and written consent forms were given to the patients with information about the study. At baseline, clinical parameters like Turesky modification of Quigley-Hein plaque index[5,6] and Gingival index of Loe and Sillness[7] were recorded. The Plaque index was recorded after scaling and root planing to standardize the value for both groups. Clinical parameters like GI and PI were again recorded on the 7th and 14th day. Also, Salivary pH was recorded for both the groups before and after performing the oral prophylaxis procedure on the same day. The patients were asked to collect unstimulated saliva into their mouths for evaluating the salivary pH using commercially available pH paper strips (Thermomate® pH 1-14 Test Indicator Litmus Paper). The colour change was then evaluated using the pH chart (Universal indicator). The pH scale runs from 0-14, with each number assigned a different colour. The bottom of the scale is a red colour indicating the most acidic and dark blue that is on the opposite end indicates alkalinity.

Statistical Analysis

The result was analysed using SPSS software 17.0. (IBM SPSS STATISTICS). Statistical comparison between both the groups was done using an independent t-test ($p < 0.05$). Intra-group statistical analysis in the test and the control group was done using a dependent sample t-test ($p < 0.05$).

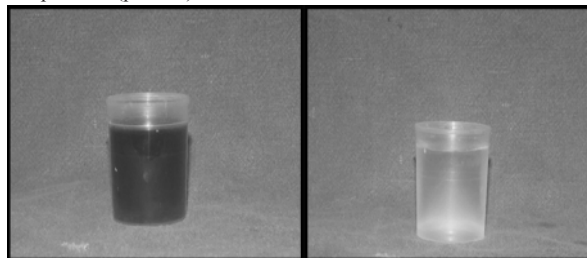


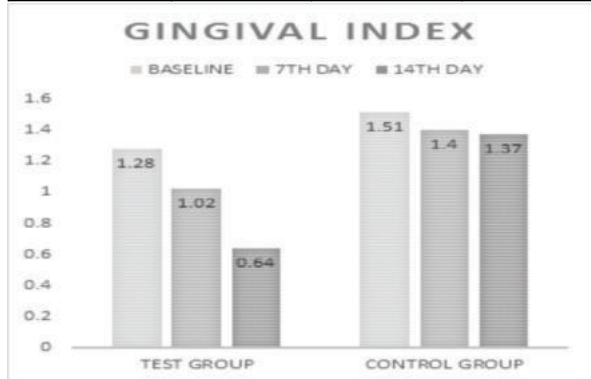
Fig 1: White Tea Extract And Distilled Water

Table 1: Inter And Intragroup Comparison On Gingival And Plaque Index

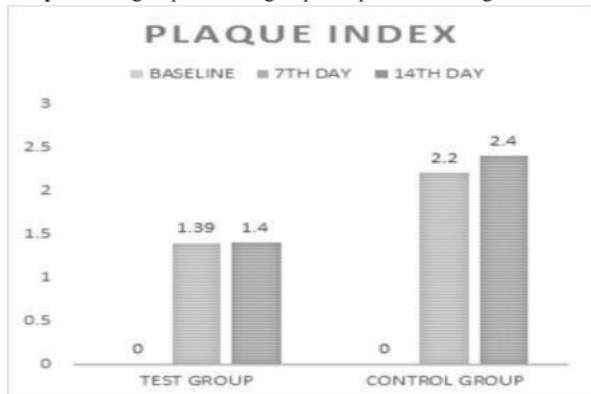
	Gingival Index				Plaque Index			
	Baseline	7 th day	14 th day	p-value	Baseline	7 th day	14 th day	p-value
Test group	1.28±0.19	1.02±0.03	0.64±0.19	<0.001	0.0 ± 0.0	1.39±0.49	1.40±0.51	<0.001
Control group	1.51±0.28	1.40±0.28	1.37±0.31	<0.001	0.0 ± 0.0	2.20±0.41	2.40±0.51	<0.001
p-value	0.011	<0.001	<0.001		NA	<0.001	<0.001	

Table 2: Inter And Intragroup Comparison Of Changes In Salivary Ph

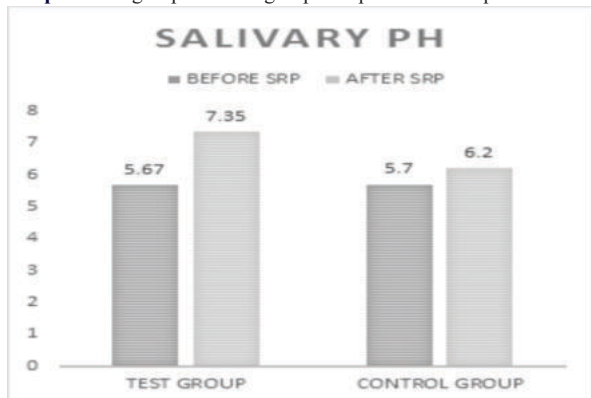
Change in salivary pH			
	Before SRP	After SRP	p-value
Test group	5.67±0.62	7.35±0.68	<0.001
Control Group	5.70±0.63	6.20±0.41	<0.001
p-value	0.772	<0.001	



Graph 1: Intergroup And Intragroup Comparison Of Gingival Index



Graph 2: Intergroup And Intragroup Comparison Of Plaque Index



Graph 3: Intergroup And Intragroup Comparison Of Change In Salivary pH Index

RESULTS

Clinical parameters like plaque index and gingival index were recorded at baseline, 7th and 14th day. Also, the change in salivary pH

was checked before and after scaling.

In this study, on intra-group comparison for the gingival index, the test group, as well as the control group both, showed a highly statistically significant decrease (p<0.001). For the Plaque index, on the intragroup comparison, both the groups gave a statistically highly significant decrease in the values (p<0.001). But, on intergroup comparison for gingival index and plaque index, the test group gave statistically better results when compared to the control group on the 7th and 14th day.

The change in salivary pH was also checked for the test and the control group before and after ultrasonic scaling. The change in the salivary pH was more towards the basic pH in the test group than in the control group. There was a statistically significant increase in the salivary pH.

DISCUSSION

WT is made from the Camellia sinensis plant and contains the least amount of caffeine of all the tea varieties. The main active ingredient in non-fermented tea from Camellia sinensis is epigallocatechin gallate (EGCG), and about 20% of EGCG in white tea extract may have therapeutic benefits. WT is high in polyphenolic chemicals, which have antioxidant, antiviral, anticancer, antitoxoplasmal, and antihelminthic activities.[8] The antibacterial and antiplaque properties of white tea are attributed to the flavonoids, polyphenols, and tannins found in the tea.

The use of white tea extract along with distilled water as a coolant for ultrasonic scaling was a novel approach towards the use of benefits of white tea extract. In a study done by Wang Y et al, green tea extract was used as a coolant along with a new type of scaler tip for ultrasonic scaling. According to this study, using the drug along with distilled water as a coolant, not only delivers the drug efficiently throughout the oral cavity but also, as the coolant is sprayed at a particular pressure aid in adequate Intra-sulcular delivery of the drug.[9]

In this study, there was a statistically significant decrease in the test group when compared to the control group. This is in accordance with the study done by Mitra et al, in which it was claimed that tea mouth rinse was found to be effective antiplaque and anti-inflammatory agent.[10] WT and Green Tea mouth rinses were proven to be potent antiplaque agents in a study done by Nagar A et al., however less effective than chlorhexidine mouth rinse.[11] WT is useful as a prophylactic modality against bacterial illnesses in the oral cavity, according to Manohar J et al.[12] Another study by Niveditha P et al. concluded that white tea mouthwash is one of the best herbal alternatives for chemical mouthwashes.[8]

The pH of saliva ranges from 6.2 to 7.6, with a mean of 6.7. During repose, the pH of the mouth does not fall below 6.3. Saliva maintains a pH balance in the oral cavity that is near to neutral (6.7-7.3). The two most important elements in plaque formation are oral bacteria that destroy food particles and raise the pH. Second, to form tooth plaque crystals that cause periodontal disease, the pH must rise over 7.6.[13]

In this study, there was a statistically significant increase in the salivary pH in the test group when compared to the control group. This is in accordance with the study done by Baliga S et al, in which it was stated that a saliva pH of 7 usually indicates a healthy dental and periodontal situation.[13] According to the author's knowledge, this study was the first study done in which white tea extract was used along with distilled water as an irrigant solution for ultrasonic scaling to determine its antiplaque and anti-inflammatory efficacy.

CONCLUSION

This study concluded the anti-plaque and anti-inflammatory efficacy of 2% WT extract as an irrigating solution for ultrasonic scaling. It not only helped in maintaining adequate oral hygiene but also ensured balanced delivery of drug intra-sulcularly by using it as an irrigating solution during ultrasonic scaling. Future research is also required for understanding the effect of white tea extract on oral tissues as well as understanding the importance of using the drug directly as an irrigating solution.

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