

“EFFECTIVENESS OF GREEN TEA MOUTHWASH IN REDUCING ORAL MUCOSITIS AMONG PATIENTS WITH ORAL CANCER: A QUASI-EXPERIMENTAL STUDY”

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Received: 25th May, 2026; Revised: 6th June, 2026; Accepted: 8th June, 2026; Available Online: 09th June, 2026

ABSTRACT

Purpose: Oral mucositis is a frequent and debilitating complication of cancer therapy that significantly impairs quality of life. This study aimed to evaluate the effectiveness of green tea mouthwash in reducing oral mucositis among oral cancer patients.

Methods: A quasi-experimental pre-test–post-test control group design was conducted among 60 oral cancer patients in a tertiary care hospital in Belagavi, India. Participants were allocated into experimental (n=30) and control (n=30) groups. The experimental group received green tea mouthwash twice daily for 7 days. Oral mucositis was assessed using the Oral Mucositis Assessment Scale (OMAS). Data were analysed using descriptive and inferential statistics.

Results: Baseline characteristics were comparable between groups ($p > 0.05$). At pre-test, no significant difference in mucositis severity was observed ($\chi^2 = 0.480$, $p = 0.731$). Post-intervention, a statistically significant reduction in mucositis severity was noted in the experimental group compared to the control group ($\chi^2 = 10.253$, $p = 0.004$).

Conclusion: Green tea mouthwash significantly reduces oral mucositis severity and represents a safe, cost-effective supportive care intervention.

Keywords: Oral mucositis · Green tea · Oral cancer · Supportive care · OMAS

How to cite this article: Dhamnekar S, Bhupali P, Ahmed I. Effectiveness of green tea mouthwash in reducing oral mucositis among patients with oral cancer: a quasi-experimental study. *Int J Drug Deliv Technol.* 2026;16(74s): 552-559. DOI: 10.25258/ijddt.16.74s.65

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Cancer is a major global health problem and a leading cause of morbidity and mortality worldwide.¹ It is characterized by the uncontrolled growth and spread of abnormal cells, influenced by genetic, environmental, and lifestyle factors.² Despite advancements in early detection and treatment, cancer continues to impose a significant burden on individuals, families, and healthcare systems.¹

Among the various types, oral cancer is highly prevalent, particularly in developing countries like India.³ It commonly affects the lips, tongue, cheeks, and palate, with squamous cell carcinoma

being the most frequent type.⁴ Major risk factors include tobacco use, alcohol consumption, poor oral hygiene, and infections, all of which contribute to the transformation of normal cells into malignant ones.^{3,5}

Oral mucositis is one of the most common and distressing complications of cancer treatment, especially chemotherapy and radiotherapy.⁶ It is characterized by inflammation, ulceration, and pain in the oral mucosa, leading to difficulty in eating, speaking, and swallowing.⁷ This condition can significantly affect patients' quality of life and may result in treatment interruptions, thereby impacting recovery outcomes.^{6,7}

Current management of oral mucositis is mainly supportive, focusing on symptom relief, oral hygiene, and nutritional support. However, the lack of a standardized and effective treatment highlights the need for alternative approaches.⁸ Natural therapies, particularly green tea, have gained attention due to their safety, affordability, and therapeutic properties such as anti-inflammatory, antioxidant, and antimicrobial effects.⁹

Green tea contains bioactive compounds like epigallocatechin-3-gallate, which may help reduce inflammation and promote healing of oral tissues.¹⁰ Therefore, this study aims to evaluate the effectiveness of green tea mouthwash in reducing oral mucositis among oral cancer patients, contributing to improved patient care and quality of life.

MATERIAL AND METHODS

A quantitative approach utilizing a Quasiexperimental pre-test post-test design was adopted to conduct the study in the KLE's cancer Hospital Belagavi in 2026, after obtaining formal permission¹¹ from the head of the department. The study sample consisted of all the post-operative oral cancer patients. A total of 60 sample fulfilling the inclusion criteria were selected using a simple random sampling technique. They were randomly assigned into an experimental group (n=30) and a control group (n=30).¹² First post-operative day patients who have diagnosed as oral cancer and undergone surgery, and patients who got mucositis after assessing with mucositis scale were included in the study. The exclusion criteria

included patients having allergy to green tea, and those who are using any other prophylactic mouthwash.¹³ The study's purpose was explained to participants in their regional language, and any doubts were clarified. Written informed consent was obtained from all participants, ensuring confidentiality.¹¹ Demographic variables were collected using a multiple-choice questionnaire, followed by a pre-test assessment using the oral Mucositis Assessment Scale. This scale is standardized and objectively measuring the appearance of erythema and ulceration in the oral cavity. In the Oral Mucositis Assessment Scale, score is interpreted as follows: 0= normal oral mucosa; 1=Oral soreness and erythema; 2=Oral erythema, ulcers, solid diet tolerated; 3=Oral ulcers, liquid diet only; 4=Oral alimentation impossible.¹⁴ Green tea mouthwash was administered from the day after surgery until the 7th day for the experimental group. Green tea was freshly prepared each time, using 1-2teaspoon of green tea leaves in 200 ml of hot water, cooled and used for gargling for 30-60 second, twice a day for one week. The control group received the normal Hospital routine mouthwash. A post-test assessment was conducted at the end of the intervention on the 7th day using the same tools. Confidentiality was maintained throughout the procedure. Participants were monitored for progress and any adverse effects during the intervention. Data were analysed using descriptive and inferential method. A p value of < 0.05 was considered statistically significant.

RESULTS

Table 1 Distribution of participants by socio demographic characteristics

		Group			
		Experimental		Control	
		f	%	f	%
Age (in years)	20-40	6	20.0	3	10.0
	41-60	22	73.3	22	73.3
	61-70	2	6.7	3	10.0
	>70	0	0.0	2	6.7
Gender	Male	18	60.0	19	63.3
	Female	12	40.0	11	36.7
	Other	0	0.0	0	0.0
Educational status	Illiterate	7	23.3	9	30.0
	Primary	12	40.0	15	50.0
	Secondary	8	26.7	6	20.0
	Higher secondary	3	10.0	0	0.0
	Graduate	0	0.0	0	0.0
	Post Graduate	0	0.0	0	0.0
Occupation	Unemployed	6	20.0	9	30.0
	Labourer	5	16.7	6	20.0
	Farmer	8	26.7	10	33.3
	Private employee	9	30.0	5	16.7
	Government employee	2	6.7	0	0.0

	Professional	0	0.0	0	0.0
	Retired	0	0.0	0	0.0
	Other	0	0.0	0	0.0
	Unmarried	0	0.0	0	0.0
Marital status	Married	24	80.0	22	73.3
	Widow	6	20.0	8	26.7
	Divorced	0	0.0	0	0.0
	Alcohol consumption	0	0.0	0	0.0
Habits	Smoking	4	13.3	0	0.0
	Tobacco chewing	26	86.7	30	100.0
	None	0	0.0	0	0.0
	Tongue	0	0.0	0	0.0
Type of cancer	Floor of mouth	7	23.3	6	20.0
	Buccal mucosa	21	70.0	21	70.0
	Gums	2	6.7	3	10.0
	2	5	16.7	4	13.3
Duration of treatment (in week)	3	6	20.0	4	13.3
	4	10	33.3	12	40.0
	5	7	23.3	6	20.0
	6	2	6.7	4	13.3
	I	6	20.0	1	3.3
Stage of cancer	II	7	23.3	8	26.7
	III	14	46.7	18	60.0
	IV	3	10.0	3	10.0
	Chemotherapy	10	33.3	20	66.7
Type of treatment	Radiotherapy	5	16.7	0	0.0
	concurrent chemoradiation	15	50.0	10	33.3
	1-2	19	63.3	25	83.3
Cycle of Chemotherapy	3-4	8	26.7	3	10.0
	>4	3	10.0	2	6.7
	None	0	0.0	0	0.0
	Yes	8	26.7	10	33.3
Past history of chemotherapy or radiation therapy	No	22	73.3	20	66.7
	Yes	0	0.0	0	0.0
Family History of oral cancer	No	30	100.0	30	100.0

Most participants in both groups were aged 41–60 years (73.3%), with minimal representation above 70 years (0% experimental; 6.7% control). Males predominated (60.0% and 63.3%), while no participants belonged to other gender categories. Primary education was most common (40.0% and 50.0%), with no graduates reported. Private employees (30.0%) and farmers (33.3%) were the leading occupations. Most were married (80.0%

and 73.3%). Tobacco chewing was highly prevalent (86.7% and 100%), whereas alcohol use was absent. Buccal mucosa cancer was most common (70.0%). Stage III predominated (46.7% and 60.0%). Concurrent chemoradiation (50.0%) and chemotherapy (66.7%) were the main treatments. Most had 1–2 chemotherapy cycles, no prior treatment history, and no family history.

Table 2 Distribution of Oral Mucositis Levels in Experimental and Control Groups During Pretest and Posttest

ORAL MUCOSITIS		Group				Chi-square (Sig.)
		Experimental		Control		
		n	%	Count(n)	Column n %	
Pre test	No mucositis	0	0.0	0	0.0	0.480 (0.731)
	Mild to moderate mucositis	4	13.3	6	20.0	
	Severe mucositis	26	86.7	24	80.0	

Post test	No mucositis	2	6.7	0	0.0	10.253 (0.004) *
	Mild to moderate mucositis	21	70.0	11	36.7	
	Severe mucositis	7	23.3	19	63.3	

At baseline, oral mucositis severity was comparable between groups, with most participants having severe mucositis (86.7% experimental; 80.0% control) and no significant difference ($\chi^2 = 0.480$, $p = 0.731$). Post-intervention, the experimental group showed clear improvement, with a shift to mild-moderate

mucositis (70.0%) and reduced severe cases (23.3%), while the control group remained predominantly severe (63.3%). The post-test difference was statistically significant ($\chi^2 = 10.253$, $p = 0.004$), indicating the effectiveness of the intervention and supporting the research hypothesis.

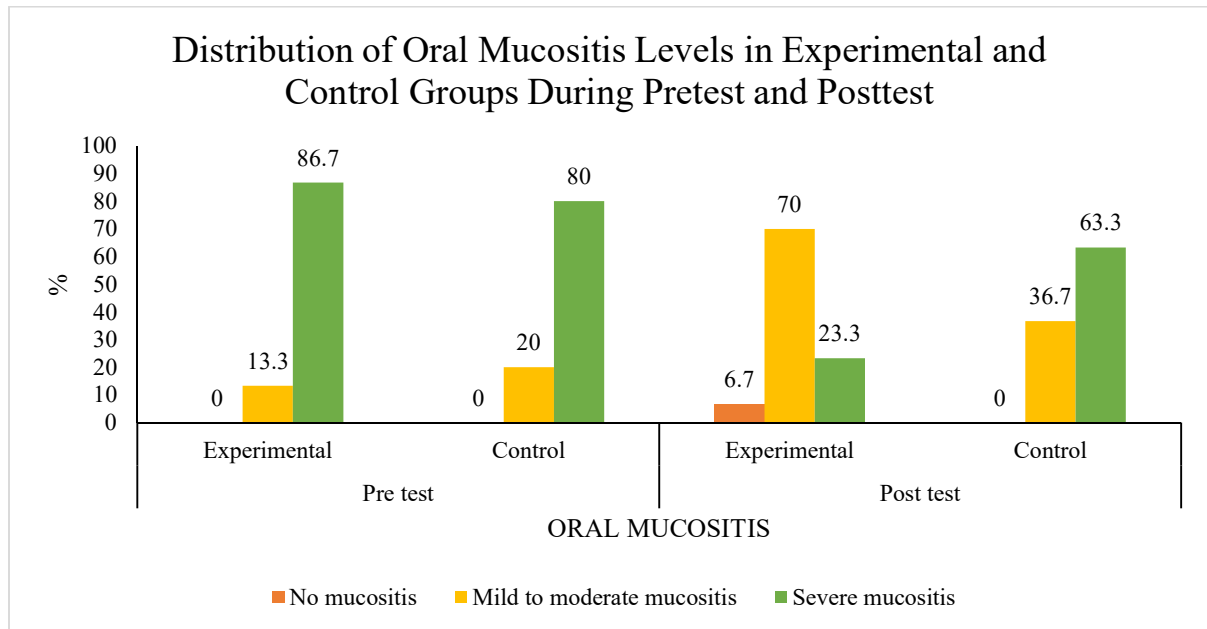


Table 3: Association between pre-test scores of oral mucositis with selected demographical variables of oral cancer patients

		Experimental Group			Chi-square (Sig.)	Control Group			Chi-square (Sig.)
		No mucositis	Mild to moderate mucositis	Severe mucositis		No mucositis	Mild to moderate mucositis	Severe mucositis	
		n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	
Age group	20-40	0 (0.0)	1 (25.0)	5 (19.2)	0.640 (1.000)	0 (0.0)	2 (33.3)	1 (4.2)	4.00 (0.214)
	41-60	0 (0.0)	3 (75.0)	19 (73.1)		0 (0.0)	4 (66.7)	18 (75.0)	
	61-70	0 (0.0)	0 (0.0)	2 (7.7)		0 (0.0)	0 (0.0)	3 (12.5)	
	>70	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	2 (8.3)	
		0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	2 (8.3)	
Gender	Male	0 (0.0)	2 (50.0)	16 (61.5)	0.192 (1.000)	0 (0.0)	3 (50.0)	16 (66.7)	0.574 (0.6410)
	Female	0 (0.0)	2 (50.0)	10 (38.5)		0 (0.0)	3 (50.0)	8 (33.3)	
	Other	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
Educational status	Illiterate	0 (0.0)	1 (25.0)	6 (23.1)	1.972 (0.779)	0 (0.0)	0 (0.0)	9 (37.5)	14.282 (<0.05) *
	Primary	0 (0.0)	1 (25.0)	11 (42.3)		0 (0.0)	1 (16.7)	14 (58.3)	
	Secondary	0 (0.0)	1 (25.0)	7 (26.9)		0 (0.0)	5 (83.3)	1 (4.2)	
	Higher secondary	0 (0.0)	1 (25.0)	2 (7.7)		0 (0.0)	0 (0.0)	0 (0.0)	
	Graduate	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
	Post Graduate	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	

Occupation	Unemployed	0 (0.0)	1 (25.0)	5 (19.2)	7.173 (0.040)*	0 (0.0)	0 (0.0)	9 (37.5)	10.665 (0.003) *
	Labourer	0 (0.0)	2 (50.0)	3 (11.5)		0 (0.0)	1 (16.7)	5 (20.8)	
	Farmer	0 (0.0)	0 (0.0)	8 (30.8)		0 (0.0)	1 (16.7)	9 (37.5)	
	Private employee	0 (0.0)	0 (0.0)	9 (34.6)		0 (0.0)	4 (66.7)	1 (4.2)	
	Government employee	0 (0.0)	1 (25.0)	1 (3.8)		0 (0.0)	0 (0.0)	0 (0.0)	
	Professional	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
	Retired	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
	Other	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
Marital status	Unmarried	0 (0.0)	0 (0.0)	0 (0.0)	1.154 (0.557)	0 (0.0)	0 (0.0)	0 (0.0)	2.727 (.155)
	Married	0 (0.0)	4 (100.0)	20 (76.9)		0 (0.0)	6 (100.0)	16 (66.7)	
	Widow	0 (0.0)	0 (0.0)	6 (23.1)		0 (0.0)	0 (0.0)	8 (33.3)	
	Divorced	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
Habits	Alcohol consumption	0 (0.0)	0 (0.0)	0 (0.0)	0.544 (1.000)	0 (0.0)	0 (0.0)	0 (0.0)	-
	Smoking	0 (0.0)	1 (25.0)	3 (11.5)		0 (0.0)	0 (0.0)	0 (0.0)	
	Tobacco chewing	0 (0.0)	3 (75.0)	23 (88.5)		0 (0.0)	6 (100.0)	24 (100.0)	
	None	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
Type of cancer	Tongue	0 (0.0)	0 (0.0)	0 (0.0)	5.230 (0.077)	0 (0.0)	0 (0.0)	0 (0.0)	18.053 (<0.05) *
	Floor of mouth	0 (0.0)	2 (50.0)	5 (19.2)		0 (0.0)	3 (50.0)	3 (12.5)	
	Buccal mucosa	0 (0.0)	1 (25.0)	20 (76.9)		0 (0.0)	0 (0.0)	21 (87.5)	
	Gums	0 (0.0)	1 (25.0)	1 (3.8)		0 (0.0)	3 (50.0)	0 (0.0)	
Duration of treatment	2.00	0 (0.0)	2 (50.0)	3 (11.5)	6.755 (0.058)	0 (0.0)	3 (50.0)	1 (4.2)	10.207 (0.012)
	3.00	0 (0.0)	2 (50.0)	4 (15.4)		0 (0.0)	2 (33.3)	2 (8.3)	
	4.00	0 (0.0)	0 (0.0)	10 (38.5)		0 (0.0)	1 (16.7)	11 (45.8)	
	5.00	0 (0.0)	0 (0.0)	7 (26.9)		0 (0.0)	0 (0.0)	6 (25.0)	
	6.00	0 (0.0)	0 (0.0)	2 (7.7)		0 (0.0)	0 (0.0)	4 (16.7)	
Stage of cancer	I	0 (0.0)	3 (75.0)	3 (11.5)	7.440 (0.022) *	0 (0.0)	1 (16.7)	0 (0.0)	15.855 (<0.05) *
	II	0 (0.0)	1 (25.0)	6 (23.1)		0 (0.0)	5 (83.3)	3 (12.5)	
	III	0 (0.0)	0 (0.0)	14 (53.8)		0 (0.0)	0 (0.0)	18 (75.0)	
	IV	0 (0.0)	0 (0.0)	3 (11.5)		0 (0.0)	0 (0.0)	3 (12.5)	
Type of treatment	Chemotherapy	0 (0.0)	1 (25.0)	9 (34.6)	3.232 (0.1980)	0 (0.0)	6 (100.0)	14 (58.3)	3.750 (0.264)
	Radiotherapy	0 (0.0)	2 (50.0)	3 (11.5)		0 (0.0)	0 (0.0)	0 (0.0)	
	concurrent chemoradiation	0 (0.0)	1 (25.0)	14 (53.8)		0 (0.0)	0 (0.0)	10 (41.7)	
Cycle of Chemotherapy	1-2 Cycle	0 (0.0)	4 (100.0)	15 (57.7)	1.831 (0.393)	0 (0.0)	6 (100.0)	19 (79.2)	0.800 (1.000)
	3-4 cycle	0 (0.0)	0 (0.0)	8 (30.8)		0 (0.0)	0 (0.0)	3 (12.5)	
	>4 cycle	0 (0.0)	0 (0.0)	3 (11.5)		0 (0.0)	0 (0.0)	2 (8.3)	
	None	0 (0.0)	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	
Past history of chemotherapy or radiation therapy	Yes	0 (0.0)	0 (0.0)	8 (30.8)	1.678 (0.314)	0 (0.0)	0 (0.0)	10 (41.7)	3.750 (0.074)
	No	0 (0.0)	4 (100.0)	18 (69.2)		0 (0.0)	6 (100.0)	14 (58.3)	
Family History of oral cancer	Yes	0 (0.0)	0 (0.0)	0 (0.0)	-	0 (0.0)	0 (0.0)	0 (0.0)	-
	No	0 (0.0)	4 (100.0)	26 (100.0)		0 (0.0)	6 (100.0)	24 (100.0)	

Mucositis levels were found to be statistically strongly associated with occupation ($\chi^2=7.173$, $p=0.040$) and cancer stage ($\chi^2=7.440$, $p=0.022$) in the experimental group. This suggests that the patients' cancer stage and occupational status were associated with the degree of mucositis.

Mucositis levels in the control group had a strong association with educational status ($\chi^2=14.282$, $p<0.05$), employment ($\chi^2=10.665$, $p=0.003$), cancer type ($\chi^2=18.053$, $p<0.05$), length of therapy ($\chi^2=10.207$, $p=0.012$), and cancer stage ($\chi^2=15.855$, $p<0.05$).

Significant association found in occupation, stage of cancer in experimental group. Educational status, occupation, stage of cancer in control group, hence H2 is accepted

DISCUSSION

This study evaluated the effectiveness of green tea mouthwash in reducing oral mucositis among patients with oral cancer and explored its association with selected socio-demographic and clinical variables. Baseline findings confirmed that the experimental and control groups were comparable, with the majority of participants being middle-aged males, tobacco users, and diagnosed at Stage III disease, thereby supporting the internal validity of the study. At baseline, no statistically significant difference in mucositis severity was observed between groups ($\chi^2 = 0.480$), with most participants presenting with severe mucositis. Following the intervention, the experimental group demonstrated a statistically significant reduction in mucositis severity compared to the control group ($\chi^2 = 10.253$, $p = 0.004$), indicating the effectiveness of green tea mouthwash as a supportive care intervention.

These findings are consistent with previous studies reporting significant reductions in ulceration and erythema among patients using green tea-based oral care interventions, likely due to the anti-inflammatory, antimicrobial, and antioxidant properties of its bioactive compounds, particularly epigallocatechin-3-gallate, which contribute to mucosal healing. Furthermore, mucositis severity showed significant associations with variables such as occupation and stage of cancer, as well as educational status in the control group, highlighting the influence of both socio-demographic and clinical factors on treatment outcomes.

Overall, the findings suggest that green tea mouthwash is an effective, safe, and cost-efficient non-pharmacological intervention for the management of oral mucositis among oral cancer patients, aligning with existing evidence in supportive oncology.

CONCLUSION

The current study's finding suggests that

administering green tea mouthwash to cancer patients undergoing chemotherapy and radiation therapy effectively prevents the occurrence and treatment of oral mucositis. This indicates that green mouthwash could be considered as non-pharmacological measure, given its simplicity, natural composition, effectiveness, and safety. This approach would provide more robust evidence regarding the efficacy of green tea mouthwash in managing oral mucositis, thus offering valuable insights for clinical practice and patients care. However, further investigation through randomized controlled trials in various settings, with a large sample size, is required to corroborate these results and generalize the findings.

ACKNOWLEDGMENTS

The authors would like to appreciate and thank all the participants who actively participated in the study and extend their cooperation to complete the study successfully

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