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A comparative study to assess the effectiveness of turmeric mouth wash verses sodium bicarbonate mouth wash in oral mucositis patients at Saveetha Medical College and Hospital, Chennai

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Abstract

Background: Patients who receive radiation therapy for head and neck cancer usually develop oral lesions ranging from mild to life-threatening levels. Radiation therapy-induced oral mucositis causes opportunistic infections which also leads to sepsis. Oral mucositis leads to poor quality of life, affects economical status, family bonding, food intake and weight maintenance, disturbs mental status etc.

Aims: The present study aims to assess the effectiveness of turmeric mouthwash versus sodium bicarbonate mouth wash in oral mucositis patients at Saveetha Medical College and Hospital, Chennai.

Methods: Quantitative research approach with quasi-experimental research design was used in this study with two group pre-test post-test design. Purposive sampling technique was used to select samples. Semi-structured interview was used to collect demographic data and WHO oral mucositis grading scale was used to assess the level of oral mucositis who underwent radiation therapy. The patients were divided into experimental group I and experimental group II and administered turmeric mouthwash and sodium bicarbonate mouthwash for one week thrice a day. After a week, oral mucositis level was re-assessed.

Results: The study results show that the oral mucositis had shown a statistically significant difference between the turmeric mouthwash and sodium bicarbonate mouthwash with a calculated unpaired 't' value of $t = 5.7210$ was found to be statistically significant at $p < 0.0001$ level. This indicates that turmeric mouthwash is more effective than sodium bicarbonate mouthwash among radiation therapy-induced oral mucositis patients.

Keywords: Oral mucositis, turmeric mouthwash, sodium bicarbonate mouthwash, radiation therapy, cancer patients

Introduction

Mucositis occurs when cancer treatments break down the rapidly divided epithelial cells, lining the gastro-intestinal tract (which goes from the mouth to the anus), leaving the mucosal tissue open to ulceration and infection. Mucosal tissue is one of the most sensitive parts of the body and is particularly vulnerable to chemotherapy and radiation. Oral mucositis is probably the most common, debilitating complication of cancer treatments which can lead to several problems, including pain, nutritional problems as a result of inability to eat, and increased risk of infection due to open sores in the mucosa^[1].

These lesions usually lead to a significant decrease in quality of life, since they can prolong hospital stay, affect the nutritional status and economic status of the patient, increase the risk of infections, and increase the prescription of opioids^[2].

The prevalence and severity of mucositis vary according to the presence of risk factors (eg, age, sex, and certain gene types) derived from patients^[3]. However, it has been recognized that mucositis is the result of complex and multifaceted biological events involving multiple signaling pathways and interactions between the epithelium and the underlying submucosa^[4].

Patients treated with radiation therapy for head and neck cancer typically receive an approximately 200 cGy daily dose of radiation, five days per week, for 5–7 continuous weeks. Almost all such patients will develop some degree of oral mucositis. In recent studies, severe oral mucositis occurred in 29–66% of all patients receiving radiation therapy for head and neck cancer^[5, 6].

In one study, approximately 16% of patients receiving radiation therapy for head and neck cancer were hospitalized due to mucositis [11]. Further, 11% of the patients receiving radiation therapy for head and neck cancer had unplanned breaks in radiation therapy due to severe mucositis [11]. Thus, oral mucositis is a major dose-limiting toxicity of radiation therapy to the head and neck region. In radiation-induced oral mucositis, lesions are limited to the tissues in the field of radiation, with non-keratinized tissues affected more often. The clinical severity is directly proportional to the dose of radiation administered. Most patients who have received more than 5000 cGy to the oral mucosa will develop severe ulcerative oral mucositis [7]. Recent studies have indicated that pathways associated with pro-inflammatory molecules including cyclo-oxygenase-2, nuclear factor-kappa B, and interleukin-6 are upregulated in oral mucositis. Thus, these may provide potential therapeutic targets for new therapies [8].

Turmeric has the tendency to heal wounds that has been used for over 2500 years in India. Research conducted at the University of Michigan, by Ayyaluswamy Ramamurthy in 2009, showed that curcumin in turmeric helps regulate cells by inserting itself into the cell membrane and interfering with molecular pathways that lead susceptible to infections and even to cancer. The active ingredient in turmeric is curcumin which often recommended to protect healthy cells from harmful effect of radiation and chemotherapy, without reducing the effectiveness of these treatments [9].

The effects of a sodium bicarbonate mouthwash solution in thought to aid in the formation of granulation tissue and to promote healing. Sodium bicarbonate mouthwash solution is safe, economical and has been used in cancer patients. Sodium bicarbonate mouthwash solution gargles cleanses the wound, reduces swelling and can decrease pain [10].

Therefore, oral decontamination may reduce mucositis that in turn, may reduce bacteremia. Furthermore, oral decontamination can reduce infection of the oral cavity by opportunistic pathogens [11].

The idea that mucositis could be inhibited by indirect modulation of radiotherapy- or chemotherapy-initiated pathways provides an opportunity for the development of more targeted therapies and interventions.

Methods and Materials

A quantitative approach with quasi experimental research design was used to conduct the study in oncology ward at Saveetha Medical College and Hospital, Thandalam. 60 samples were selected by using purposive sampling technique. The criteria for sample selection was Oral cancer patients with Radiation therapy induced oral mucositis at oncology ward, patients in-between the age group of 20 -60 years, patients receiving Radiation therapy for more than a week, patients who are all conscious and able to follow the instructions, patients who can speak and understand Tamil, patients who are willing to participate. The exclusion criteria for the samples were patients who are not willing to participate, patients who are unconscious and critically ill, patients below 20 years and above 60 years of age. The data collection was done with prior permission from the HOD of Oncology Department and ethical clearance was obtained from the institution. The purpose of the study was explained to the samples with written informed consent was obtained from them. The demographic data were collected by using structured questionnaire. Oral mucositis level were assessed before intervention in both groups. Then patients in experimental group 1 were asked to do turmeric mouthwash

thrice a day for a week and experimental group 2 with sodium bicarbonate mouthwash vice versa. After a week, oral mucositis parameter levels were re-assessed among both experimental groups by using same WHO oral mucositis grading scale. The data were analyzed using descriptive and inferential statistics. The sample characteristics were described using frequency and percentage distribution. Pearson's co-relation coefficient was used to assess the effectiveness of turmeric mouthwash and sodium bicarbonate mouthwash in the experimental groups. Chi square used to associate the post test level of oral mucositis with the selected demographic variables.

Results and Discussion

Section A: Sample characteristics

In this study regarding age, in the experimental group I, 1(3.33%) were in the age group of 21 to 30 years, 6(20%) were in the age group of 31 to 40 years, 14 (46.67%) were in the age group of 41 to 50 years, 9 (30%) were in the age group of 51 to 60 years. In experimental group II 2(6.67%) were in the age group of 21 - 30 years, 5(16.67%) were in the age group of 31 to 40 years, 17(56.67%) were in the age group of 41 to 50 years and 6 (20%) were in the age group of 51 to 60 years. Regarding Sex in experimental group I about 22 (73.33%) were male and 8 (26.67%) were female. In experimental group II 24(80%) were male and 6(20%) were female. Regarding religion in the experimental group I 21 (70.0%) were hindus, 4(13.33%) were Christians and 5 (16.67%) were muslim. In experimental group II 23(76.67%) were hindus, 3(10%) were Christians and 4(13.33%) were muslims. Regarding marital status in experimental group I 6(20%) were unmarried, 15 (50%) were married, 3(10%) were widow, 1(3.33%) were divorced and 5(16.67%) were separated. In experimental group II 9(30%) were unmarried, 13 (43.33%) were married, 5(16.66%) were widow, 3(10%) were separated and there were no widows. Regarding residential area in experimental group I 21 (70%) were living in urban, 9(30%) were living in rural. In experimental group II 18 (60%) were living in urban, 12(40%) were living in rural. Regarding educational status in experimental group I 9 (30%) were primarily educated (1st to 5th std), 6 (20%) were secondarily educated (6th to 12th std), 5 (16.67%) were higher secondarily educated (11th, 12th std), 1(3.33%) are diploma, 2 (6.67%) were undergraduated, 7 (23.33%) were illiterate and there were no postgraduates. In experimental group II 6 (20%) were primarily educated (1st to 5th std), 4 (13.33%) were secondarily educated (6th to 12th std), 8%) were higher secondarily educated (11th, 12th std), 1(3.33%) were diploma, 1(3.33%) were undergraduated, 10 (33.33%) were illiterate and there were no postgraduates. Regarding family history of cancer in experimental group I 16 (53.33%) had family history of cancer and 14 (46.67%) had no family history of cancer. In experimental group II 13 (43.33%) had family history of cancer and 17 (56.67%) had no family history of cancer. Regarding duration of cancer in experimental group I 5(16.67%) belongs to 0 – 1 year of duration, 9(30%) belongs to 2 to 3 years duration, 8 (26.67%) belongs to 4 to 5 years duration and 8 (26.67%) belongs to above 5 years. In experimental group II, 4(13.33%) belongs to 0 – 1 year of duration, 7(23.33%) belongs to 3 years duration, 5 (16.67%) belongs to 4 to 5 years duration and 14 (46.67%) belongs to above 5 years. Regarding Stage of cancer in experimental group I 2 (6.67%) belongs to stage I, 6(20%) belongs to stage - II, 17 (56.67%) belongs to stage- III and 5 (16.67%) belongs to

stage IV. In experimental group II 6 (20%) belongs to stage I, 9 (30%) belongs to stage - II, 6 (20%) belongs to stage- III and 9 (30%) belongs to stage IV. Regarding history of using dentures in experimental group I 30 (100%) were not using dentures. Also in experimental group II 30 (100%) were not using dentures.

Section B: Effectiveness of turmeric mouthwash and sodium bicarbonate mouthwash among oral mucositis patients.

The present study reveals that in the experimental group I in the pretest, majority 16 (53.33%) had moderate level of oral mucositis, 10 (33.33%) had severe and 4 (13.33%) had mild level of oral mucositis. Whereas in the post test after the administration of turmeric mouthwash intervention, majority 15 (50%) had no oral mucositis and 12 (40%) mild level of oral mucositis and 3 (10%) had moderate level of oral mucositis.

The table 3 shows that in the experimental group II in the pretest, majority 20 (66.67%) had moderately level of oral mucositis, 8 (26.67%) had severe and 2 (6.67%) had life threatening level of oral mucositis. Whereas in the post test after administration of sodium bicarbonate mouthwash intervention, majority 13 (43.33%) had moderate level of oral mucositis and 12 (40%) had mild oral mucositis and 1 (3.33%) has no oral mucositis.

Section C: Comparing the effectiveness of turmeric mouthwash and sodium bicarbonate mouthwash among oral mucositis patients

The study results shows that in the experimental group I, the post test mean score of oral mucositis was 0.60 ± 0.67 whereas in the experimental group II, the post test the mean score of oral mucositis was 1.66 ± 0.75 . The calculated unpaired 't' value of $t = 5.7210$ was found to statistically significant at $p < 0.0001$ level. This shows that there was significant difference between the level of oral mucositis among patients in the experimental group I and experimental group II. This clearly indicates that turmeric mouthwash was found to be effective than sodium bicarbonate mouthwash in reducing the level of oral mucositis among cancer patients receiving radiation therapy.

Table 1: The level of oral mucositis among patients in the experimental group I and experimental group II

Oral Mucositis patients	Mean	S.D	Unpaired 't' Value
Experimental group I	0.60	0.6747	$t = 5.7210$ $p = 0.0001, S^{***}$
Experimental group II	1.66	0.7581	

Section D: Association of post test level of oral mucositis among cancer patients receiving radiation therapy with their selected demographic variables in the experimental group I.

Experimental group I reveals that the demographic variables such as age, sex, religion, marital status, type of resident, educational status, family history of cancer, duration of cancer and stage of cancer doesn't shown statistically significant association with post test level of oral mucositis among cancer patients.

Experimental group II reveals that the demographic variables such as religion and educational status shown statistically significant association with post test level of oral mucositis among cancer patients and other demographic variables such as age, sex, marital status, type of resident, family history of cancer, duration of cancer and stage of

cancer had not shown statistically significant association with post test level of oral mucositis.

Conclusion

The results of this study indicates that turmeric mouthwash is more effective than sodium bicarbonate mouthwash among radiation therapy induced oral mucositis. Sodium bicarbonate mouthwash also has the tendency to reduce oral mucositis but less effective when compared with turmeric mouthwash.

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