

# Effectiveness of Topical Application of Pure Honey on Oral Mucositis in Cancer Patients Undergoing Radiotherapy

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**Abstract:** Cancer is one of the leading causes of death around the world. Most cancers of head and neck cancers are squamous cell carcinomas or cancers that begin in the lining of the mouth, nose and throat. Treatment modalities of cancer include combination of surgery, radiotherapy, chemotherapy or a combination escorted by restoration therapy and social support. Radiation therapy causes direct exposure of tissues of oral cavity, salivary glands and bones to ionizing radiation causing direct damage to them. The type of cancer and the modality used for treatment affects the occurrence and severity of oral mucositis. Present study was focused to assess the effectiveness of topical application of pure honey on oral mucositis in cancer patients undergoing radiotherapy. The study was conducted at Sri Guru Ram Dass Cancer hospital, vallah, Amritsar. Quasi-experimental design was adopted for the study. Purposive sampling technique was used to select the sample. A total sample of 60 patients (30 patients of experimental and 30 of control group). The samples were selected based on inclusion criteria. Socio-demographic profile and information regarding cancer was collected from the cancer patients undergoing radiation therapy. Oral mucositis assessment tool was used to assess the level of oral mucositis among cancer patients by observation method. Pre-test assessment was done in both the groups. Honey application was given for the patients in experimental group before and after 15 minutes of radiation therapy and advised the patient to repeat the same for in their homes after 6 hours of post radiation for 14 days The post-test was done after 1<sup>st</sup> week and 2<sup>nd</sup> week in experimental and control group. The data was analysed using descriptive and inferential statistics. Result reveals that during post-test in experimental group mean score was  $10.96 \pm 0.85$  and in control group was  $14.63 \pm 1.18$  with calculated  $t$  value 13.74 and  $p=0.000$  was statistically significant. Findings concluded that application of honey on oral mucositis was shown effective in reducing oral mucositis in experimental group among cancer patients undergoing radiotherapy. Patients with head and neck cancer patients undergoing radiation therapy can apply honey before and after undergoing radiation therapy to reduce radiation induced oral mucositis.

**Keywords:** Pure honey, Oral mucositis, Cancer patients undergoing radiotherapy therapy

## 1. Introduction

Cancer is a disease process that begins when an abnormal cell is transformed by the genetic mutation of the cellular DNA. This abnormal cell forms a clone and begins to proliferate abnormally, ignoring growth regulating signals in environment surrounding the cell. The cancer may also spread to more distant parts of the body through the lymphatic system or bloodstream. Not all tumours are cancerous. There are over 200 different known cancers that afflict humans. Cancer can occur in all persons irrespective of age, sex, socio economic status culture and geographical area. Different forms of cancer strikes special age, ethnic gender groups which varying frequently and severity.<sup>1</sup>

Cancer is one of the leading causes of death around the world. It is estimated that around 84 million people died of cancer between 2005 and 2015 without intervention. Low income and medium income countries are harder hit by cancer than the developed countries. It is essential to address the world's growing cancer burden and effective control measures to minimise the risk<sup>2</sup>

In 2016 an estimated 1,685,210 new cases of cancer will be diagnosed in United States, 595,690 people will die from the disease. More than 60% of world's new cancer cases occur in Africa, Asia and Central and South America. 70% of

world's cancer deaths occur in these region. In India it is estimated that 2.5 million people are living with the disease. Every year new cancer patients registered over 7 lakh, Cancer related deaths are 5, 56,400. Deaths in the age group between 30-69 years are about 3,95,400 (71% of all cancer related deaths).<sup>3</sup> Cancer incidence in the state of Punjab is higher than the national average of 80 per 100,000 reveals a survey by Punjab government. The study underscores that a Malwa region inflamed as the cancer belt has highest number of cancer patients- 107 in 100,000 populations. Four districts that topped the cancer incidence are from this region. With 136 cancer cases per 100,000 population, Mukatsar as it fares the worst. It is closely followed by Mansa, Bathinda and Ferozepur districts. Tarn Taran district in the Majha region the least number of cancer patients- 41 per 100,000.<sup>4</sup>

Head and neck is a term used to define cancer that develops in mouth, throat, nose, salivary glands, or other areas of the head and neck. Most cancers of head and neck cancers are squamous cell carcinomas or cancers that begin in the lining of the mouth, nose and throat. Eighty five percent of head and neck cancers are linked to tobacco use and seventy five percent are associated with a combination of tobacco and alcohol use.<sup>5</sup>

Head and neck cancers are common in several regions of the world where tobacco use and alcohol consumption is high. High rates (> 10/100,000) in females are found in the Indian sub-continent, Hong Kong and Philippines. The highest incidence rate reported in males is 63.58 (France, Bas-Rhin) and in females 15.97 (India, Madras). The variation in incidence of cancers by subsite of head and neck is mostly related to the relative distribution of major risk factors such as tobacco or betel quid chewing, cigarette or bidi smoking, and alcohol consumption. Some degree of misclassification by subsites is a clear possibility in view of the close proximity of the anatomical subsites.<sup>6</sup>

During radiation therapy oral cavity is directly exposed to high dose radiation which will lead to several side effects, oral mucositis being the most distressing one. Chemotherapy and radiotherapy preferentially act on rapidly dividing cells which may include tumour cells as well as basal cells of mucosal lining. Due to this effect it slows down the formation of new cells instead of damaged tissue for repair. Thus the time for repair is prolonged. Radiation therapy causes direct exposure of tissues of oral cavity, salivary glands and bones to ionizing radiation causing direct damage to them. The type of cancer and the modality used for treatment affects the occurrence and severity of oral mucositis.<sup>7</sup>

The acute effects of radiation therapy include altered salivary glands function and risk of mucosal infection. The long term effects are due to changes in the vascularity and cellularity of soft tissue and bone, damage to the salivary glands and increased collagen synthesis resulting fibrosis. These changes lead to hypovascularity, hypercellularity and hypoxia of the tissues. The effected bone and soft tissue have a reduced capacity to remodel and may be at increased risk of infection and necrosis.<sup>8</sup>

Oral mucositis is defined as an inflammatory lesion of oral mucosa resulting from the cancer therapy. It is an inflammation of mucosa with burning or tingling sensation. Typically it is characterised by atrophy of squamous epithelium, vascular damage, infiltration, ulceration, erythema, and pseudo-membrane formation. It usually occurs at mucus membrane of mouth, gastrointestinal tract, or the airway due to chemical irritation, chemotherapy or radiotherapy. It is described in 5 overlapping stages: initiation, up-regulation, message generation, ulceration and healing.<sup>9</sup>

Effective management of oral mucositis is very important. The basic management of oral mucositis is still symptomatic with the aim to relieve pain and discomfort associated with it, Honey is one of the best complementary treatments with no side effects and has great results.<sup>10</sup>

Honey is a heterogeneous mixture of proteins, flower nectar sugars, and glandular secretions produced by honey bees. Honey is an important traditional medicine prophylactic agent that has numerous beneficial health properties in its ability to facilitate healing. It has a powerful impact on the proliferation of B-lymphocytes and T-lymphocytes and also in the activation of macrophages. It inhibits inflammatory process by inhibiting cyclooxygenase pathway because it is

the main pathway of inflammation. It stimulates the process of granulation tissue, angiogenesis, rapid epithelisation and proliferation of fibroblasts. Honey is a natural product with rich nutritional properties, i.e., economical and a pleasant agent for mucositis.<sup>11</sup>

Health professionals, particularly nurses, play an important role in helping individuals cope with the symptoms of mucositis and tolerate the cancer treatment that causes it. Health professionals will probably monitor individuals receiving cancer treatment, for signs of mucositis in early stages of treatment, so that they begin treating the condition as soon as it develops. This is a crucial step in reducing the severity of symptoms and improving quality of life. It is cost effective and affordable for patients.<sup>12</sup>

Honey if proven effective can be an easily available cheap measure of preventing oral mucositis which patient themselves can apply. A good preventing agent for oral mucositis can be a great good thing towards the clients suffering from the most distressing effects of cancer. Although a few studies were conducted abroad to assess the effect of honey in oral mucositis there are very little studies conducted in India. Hence this study will be undertaken with the aim to assess the effect of application of honey in prevention of oral mucositis among subjects undergoing radiation therapy.

### Statement Problem

A Quasi-Experimental study to assess the effectiveness of Topical Application of Pure Honey on Oral Mucositis in Cancer patients undergoing Radiotherapy in selected Hospitals of district Amritsar, Punjab.

### Objectives of Study

- To assess the pre-test level of mucositis score in experimental and control group.
- To assess the post-test level of mucositis score in experimental group and control group.
- To compare the pre-test and post-test level of mucositis score in experimental group and control group.
- To find out the association between the level of mucositis score in the experimental group with their selected socio-demographic variables.

### Hypothesis

**H<sub>0</sub>** There will be no significant difference between experimental group and control group in mucositis score after application of pure honey undergoing radiotherapy.

**H<sub>1</sub>** There will be significant difference between experimental group and control group in mucositis score after application of pure honey undergoing radiotherapy.

## 2. Research Methodology

### Research Approach

Approach to research involves the description of plan to investigate the phenomenon under study. For the present study Quantitative research approach was considered to assess the effectiveness of topical application of pure honey on oral mucositis in cancer patients undergoing radiotherapy in selected hospitals of district Amritsar, Punjab.

**Research Design**

Quasi experimental study design was used to achieve the objectives of the study.

- Experimental group – O1 X O2
- Control group – O1 - O2
- O1 – Pre-test, X-Intervention, O2 – Post-test.

**Variables under study**

**Independent variable:** Topical application of pure honey.

**Dependent variable:** Oral Mucositis in cancer patients undergoing radiotherapy

**Research Settings**

The study was conducted in Sri Guru Ram Das Cancer hospital, vallah, Amritsar.

**Population**

The population of the present study included the head and neck cancer patients undergoing radiotherapy.

**Sample and Sampling Technique**

Purposive sampling technique was used to select the sample. A total sample of 60 patients (30 patients of experimental and 30 of control group) admitted in oncology department at Sri Guru Ram Das Cancer hospital, vallah, Amritsar.

**Sampling Criteria**

**Inclusion Criteria**

- Patients of head and neck cancer patients undergoing radiotherapy.
- Patients above 15 years of age, both male and female.

**Exclusion Criteria**

- Patients suffering with diabetes mellitus.
- Patients who were not co-operative.
- Patients who were not available at the time of data collection.

**Description of the Tool**

**Section A**

Socio Demographic Profile to collect personal information of the cancer patients of head and neck cancer like gender, age (in years), educational qualification, occupation, area of residence, monthly family income (in rupees), personal habits, source of information, family history of cancer, stage of cancer, location of cancer and duration of radiotherapy, chemotherapy and surgery of cancer.

**Section B:** Oral Mucositis Assessment Scale

**Part B: Oral Mucositis Assessment Tool**

The oral mucositis assessment tool consists of the following components to assess the level of mucositis among patients undergoing radiation therapy.

S. No	Components	S. No	Components
1	<b>Voice</b> 1. Normal 2. Deeper or raspy 3. Difficulty talking	6	<b>Lips</b> 1. Smooth and moist 2. Dry or cracked 3. Ulcerated or bleeding
2	<b>Swallow</b> 1. Normal 2. Pain on swallowing 3. Unable to swallow	7	<b>Gums</b> 1. Pink and firm 2. Redness and edematous 3. Bleeding
3	<b>Mucous membrane</b> 1. Pink or moist 2. Red or coated 3. Ulcerations/bleeding	8	<b>Teeth/dentures</b> 1. Clean and No debris 2. Localized plaque/debris 3. Generalized plaque and debris
4	<b>Saliva</b> 1. Watery 2. Thick or ropy 3. Absent	9	<b>Ability to maintain Nutrition</b> 1. Normal diet 2. Soft diet 3. Fluids only/Nil per oral
5	<b>Tongue</b> 1. Pink and moist 2. Coated or shiny 3. Ulcerations or bleeding	10	<b>Taste</b> 1. Normal 2. Impaired/change 3. No taste

**Scoring Criteria:**

The tool consists of 10 components, which includes 3 items in each component.

Minimum item score in 1 and maximum item score is 3. Total score is 30.

- Mild Mucositis – 1-10 score
- Moderate Mucositis – 11-20, Severe
- Mucositis – 21-30

**Description of intervention**

The intervention was finalized based on extensive review of literature related to application of pure honey on oral mucositis. In the present study Non-invasive procedure was used i.e. Application of pure honey on oral mucositis among patients undergoing radiation therapy before and after 15 minutes of radiation therapy and advised the patient to apply after 6 hours of post radiation for 14 days.

**Validity of tool**

The tool was submitted to experts from field of Medical Surgical Nursing. It was determined by expert opinion on relevance of items. The tool was circulated among experts from various fields of specialisation. Such as from Medical Surgical Nursing and professor of Oncology department. Final tool was made after making the necessary changes after doing pilot study.

**Reliability of tool**

The reliability of tool was measured by using cronbach's alpha r=.734. The tool was found to be reliable.

**Ethical Considerations**

With the view of ethical consideration the researcher has taken permission from ethical committee of S.G.R.D. Nursing Institute, Pandher, Amritsar to conduct research study. Written permission was taken from the Director of Sri Guru Ram Das University of Health Sciences, Sri Amritsar. The consent was taken from the subjects who were willing to take part in the study. To gain their confidence, they were

ensured that their response will be kept confidential and will be used for only research purpose. The purpose of the study was explained to the subjects. They were also informed about their right to refuse from participation in the study.

### 3. Analysis and Interpretation

**Table 1:** Frequency and percentage distribution of demographic variables, N=60

S. No	Demographic Variable	Experimental Group		Control Group	
		f	%	f	%
1.	<b>Age (in Years)</b>				
	a. 15-25 yrs	2	6.7	3	10
	b. 26-35 yrs	8	26.7	13	43.3
	c. 36-45 yrs	16	53.3	8	26.7
	d. 46 yrs and above	4	13.3	6	20
2	<b>Gender</b>				
	a. Male	19	63.3	19	63.3
	b. Female	11	36.7	11	36.7
3	<b>Education</b>				
	a. No formal education	1	3.3	0	0
	b. Up to Primary level	22	73.3	21	70
	c. Higher secondary	7	23.4	8	26.7
	d. Graduation	0	0	1	3.3
4	<b>Occupation</b>				
	a. Agriculture	1	3.3	2	6.7
	b. Labour	11	36.7	14	46.7
	c. Employed	3	10	4	13.3
	d. Business	6	20	4	13.3
	e. Unemployed	9	30	6	20
5	<b>Area of residence</b>				
	a. Urban	8	26.7	15	50
	b. Rural	22	73.3	15	50
6	<b>Monthly income (Rs)</b>				
	a. ≤ 5000	16	53.3	12	40
	b. 5001-10000	14	46.7	14	46.7
	c. 10001-15000	0	0	4	13.3
7	<b>Personal habits</b>				
	a. Smoking	0	0	2	6.6
	b. Alcohol	6	20	2	6.6
	c. Smoking and alcohol	7	23.3	9	30
	d. Other tobacco products	6	20	3	10
	e. None	11	36.7	14	46.7

Table 1 shows the distribution of demographic variables of cancer patients undergoing radiotherapy. According to age of cancer patients in experimental group was 8(26.7%) were in 26-35 years of age and 2(6.7%) were in 15-25 years of age. In control group, 13(43.3%) were in 26-35 years of age and 3(10%) were in 15-25 years of age. Regarding gender of cancer patients in experimental group reveals that 19(63.3%) were male and 11(36.7%) were female. In control group 19(63.3%) were male and 11(36.7%) were female. According to educational status of cancer patients, in experimental group 22(73.3%) had completed up to primary level and 1(3.3%) had no formal education. In control group 21(70%) had completed up to primary level and 1(3.3%) had completed graduation. Occupation of cancer patients in experimental group, 11(36.7%) working as laborers and 1(3.3%) were farmers. In control group 14(46.7%) working as laborers and 2(6.7%) are farmers. Area of residence, in experimental group 8(26.7%) were from urban area and 22(73.3%) were from rural area. In control group 15(50%) were from urban area and 15(50%) were from rural areas. Monthly income of cancer patients shows that in

experimental group 16(53.3%) earns up to Rs.5000 per month and 14(46.7%) income was Rs.5001-10000 per month. In control group 12(40%) earns Rs.5000 per month and 4(13.3%) income Rs.10001-15000 per month. Personal habits of cancer patients in experimental group 6(20%) had habit of alcohol, 7(23.3%) had habit of smoking and alcohol and 6(20%) had habit of using other tobacco products. In control group 2(6.6%) had habit of alcohol, 2(6.6%) had habit of smoking and alcohol, 9(30%) had habit of smoking and alcohol and 9(10%) had habit of using other tobacco products.

**Table 2:** Frequency and percentage distribution of information regarding cancer, N=60

S. No	Demographic Variable	Experimental Group		Control Group	
		f	%	f	%
1.	<b>Family history of cancer</b>				
	a) Yes	8	26.7	11	36.7
	b) No	22	73.3	19	63.3
2	<b>Location of cancer</b>				
	a) Brain	1	3.3	1	3.3
	b) Nasal	1	3.3	1	3.3
	c) Oral	13	43.3	14	46.7
	d) Neck	15	50	14	46.7
3	<b>Stage of cancer</b>				
	a) 1 <sup>st</sup> stage	13	43.3	14	46.7
	b) 2 <sup>nd</sup> stage	14	46.7	15	50
	c) 3 <sup>rd</sup> stage	3	10	1	3.3
4	<b>Duration of radiotherapy</b>				
	a) 0-1 month	21	70	21	70
	b) 1-2 month	8	26.7	9	30
	c) More than 2 months	1	3.3	0	0
5	<b>Have undergone chemotherapy</b>				
	a) Yes	30	100	28	93.3
	b) No	0	0	2	6.7

Table 2 shows distribution of information regarding cancer reveals that in experimental group, 8(26.7%) had family history of cancer and in control group 11(36.7%) had family history of cancer. Location of cancer shows that 1(3.3%) had brain cancer, 1(3.3%) had nasal cancer, 13(43.3%) had oral cancer and 15(50%) had neck cancer. In control group 1(3.3%) had brain cancer, 1(3.3%) had nasal cancer, 14(46.7%) had oral cancer and 14(46.7%) had neck cancer. According to stage of cancer, in experimental group 13(43.3%) had 1<sup>st</sup> stage of cancer, 14(46.7%) had 2<sup>nd</sup> stage of cancer and 3(10%) had 3<sup>rd</sup> stage of cancer. In control group 14(46.7%) had 1<sup>st</sup> stage of cancer, 15(50%) had 2<sup>nd</sup> stage of cancer and 1(3.3%) had 3<sup>rd</sup> stage of cancer. Duration of radiotherapy shows that in experimental group, 21(70%) were undergoing for 1 month, 8(26.7%) were undergoing for 2 month and 1(3.3%) were undergoing for more than 2 months. In control group 21(70%) were undergoing for 1 month, 9(30%) were undergoing radiotherapy for 2 month.

**Table 3:** Pre-test level of oral mucositis in Experimental and control group, N=60

Level of oral mucositis	Experimental group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	f	%	f	%	f	%	f	%
Mild mucositis	0	0	10	33.3	0	0	0	0
Moderate mucositis	26	86.7	20	66.7	25	83.3	28	93.3
Severe mucositis	4	13.3	0	0	5	16.7	2	6.7

Table 3 depicts that in experimental group 26(86.7%) had moderate level of oral mucositis and 4(13.3%) had severe oral mucositis and in control group 25(83.3%) had moderate oral mucositis and 5(16.7%) had severe oral mucositis. During post-test after 2 week after of application of honey in experimental group 10(33.3%) had mild level of oral mucositis and 20(66.7%) had moderate oral mucositis but in control group 30(100%) had moderate oral mucositis.

**Table 4:** Comparison of post-test level of oral mucositis 2 week after application of honey in Experimental group, N=30

Level of oral mucositis	Mean	SD	Mean D	't' value	df	'p' value
Pre-test	16.33	2.41	5.37	11.76	29	0.000*
Post-test	10.96	0.85				

\*p<0.05 level of significance

Table 4 illustrates the comparison between pre-test and post-test level of oral mucositis at 2 week after application of honey in experimental group, the result reveals that pre-test mean and SD was 16.33±2.41 and post-test mean and SD was 10.96±0.85 with mean difference of 5.37 and calculated t value 11.76 and p=0.000, indicates that application of honey on oral mucositis was shown effective in reducing oral mucositis among cancer patients undergoing radiotherapy.

**Table 5:** Comparison of post-test level of oral mucositis 2 week after application of honey in Experimental and control group, N=60

Level of oral mucositis	Mean	SD	Mean D	't' value	df	'p' value
Experimental group	10.96	0.85	3.67	13.74	53	0.000*
Control group	14.63	1.18				

\*p<0.05 level of significance

Table 5 depicts the comparison between post-test level of oral mucositis 2 week after application of honey revealed that in experimental group mean was 10.96±0.85 and in control group mean was 14.63±1.18 with difference in mean was 3.67 and obtained t value 13.74 and p=0.000, indicates that application of honey on oral mucositis was shown effective in reducing oral mucositis in experimental group among cancer patients undergoing radiotherapy.

**Table 6:** Association between post-test level of oral mucositis and demographic variables in Experimental group

S. No	Demographic Variables	Mild Mucositis	Moderate Mucositis	Chi value df p value
1.	<b>Age ( in Years)</b>			
	a) 15-25 yrs	2	0	3.844
	b) 26-35 yrs	7	1	3
	c) 36-45 yrs	9	7	0.278 NS
	d) 46 yrs and above	2	2	
2	<b>Gender</b>			0.287
	a) Male	12	7	1
	b) Female	8	3	0.592 NS
3	<b>Education</b>			
	a) No formal education	0	1	2.649
		16	6	2
	b) Up to Primary level	4	3	0.265 NS
	c) Higher secondary			

4	<b>Occupation</b>			
	a) Agriculture	0	1	4.727
	b) Labour	6	5	4
	c) Employed	2	1	0.316 NS
	d) Business	4	2	
	e) Unemployed	8	1	
5	<b>Area of residence</b>			0.341
	a) Urban	6	2	1
	b) Rural	14	8	0.559 NS
6	<b>Monthly income (Rs)</b>			0.067
	a) ≤ 5000	11	5	1
	b) 5001-10000	9	5	0.796 NS
7	<b>Personal habits</b>			
	a) Alcohol	5	1	1.081
	b) Smoking and alcohol	4	3	3
		4	2	0.781
	c) Tobacco products	7	4	
	d) None			

S. No	Clinical Variables	Moderate Mucositis	Severe Mucositis	Chi value df p value
1.	<b>Family history of cancer</b>			0.085
	a) Yes	5	3	1
	b) No	15	7	0.770 NS
2	<b>Location of cancer</b>			
	a) Brain	1	0	4.662
	b) Nasal	0	1	3
	c) Oral	7	6	0.198 NS
	d) Neck	12	3	
3	<b>Stage of cancer</b>			
	a) 1 <sup>st</sup> stage	8	5	1.690
	b) 2 <sup>nd</sup> stage	9	5	2
	c) 3 <sup>rd</sup> stage	3	0	0.429 NS
4	<b>Duration of radiotherapy</b>			
	a) 0-1 month	14	7	0.562
	b) 1-2 month	5	3	2
	c) More than 2 months	1	0	0.754 NS
5	<b>Have undergone surgery</b>			1.364
	a) Yes	4	4	1
	b) No	16	6	0.242 NS

Table 6 shows the association between post-test level of oral mucositis with demographic and clinical variables in Experimental group which was tested by using chi-square test. The result reveals that demographic and clinical variables was not found any significant association with post-test level of oral mucositis.

#### 4. Discussion

Effective management of oral mucositis is very important to relieve pain and discomfort associated with it, comforting of the oral mucosa by applying a chemical agent to eradicate the microorganisms, and stimulation of epithelisation. Honey is one of the best complementary treatments with no side effects and has great results. Present study results showed that during pre-test in experimental group 26(86.7%) had moderate level of oral mucositis and 4(13.3%) had severe oral mucositis and in control group 25(83.3%) had moderate oral mucositis and 5(16.7%) had severe oral mucositis. During post-test after 2 week after of application of honey in experimental group 10(33.3%) had mild level of oral mucositis and 20(66.7%) had moderate oral mucositis but in control group 30(100%) had moderate

oral mucositis. Study carried by **Raji Raghunath (2017)**<sup>13</sup> revealed that in pre-test in experimental group 21(70%) had moderate level of oral mucositis and 9(30%) had severe oral mucositis and in control group 23(76.7%) had moderate oral mucositis and 7(23.3%) had severe oral mucositis. During post-test after application of honey in experimental group 16(53.3%) had mild level of oral mucositis and 14(46.7%) had moderate oral mucositis but in control group 20(66.7%) had moderate oral mucositis and 10(33.3%) had severe oral mucositis. Current study findings reveals that during post-test after application of honey in experimental group mean was  $10.96 \pm 0.85$  and in control group mean was  $14.63 \pm 1.18$  with difference in mean was 3.67 and obtained t value 13.74 and  $p=0.000$ , indicates that application of honey on oral mucositis was shown effective in reducing oral mucositis in experimental group among cancer patients undergoing radiotherapy. Study conducted by **Bardy. J. Molassiots et al. (2015)**<sup>14</sup> to assess the effect of honey on oral mucositis stated that application of honey over the oral mucositis for 3 times a day had positive reduction ion mucositis and was found statistically significant at  $p<0.01$  level. Present study result reveals that demographic and clinical variables was not found any significant association with post-test level of oral mucositis. Similar results was seen in a study carried by **Hawley P et.al. (2014)**<sup>15</sup> revealed that personal characteristics of cancer patients undergoing radiation therapy were non significant and had no impact on level of oral mucositis.

## 5. Conclusion

The findings of the present study concluded that application of pure honey was effective in reducing the severity of oral mucositis among head and neck cancer patients undergoing radiation therapy. So the honey can be applied over the oral mucositis among the cancer patients before and after undergoing radiation therapy to reduce radiation induced oral mucositis.

## 6. Nursing Implications

The findings of this study can be utilized in all the domains of nursing i.e. nursing practice, nursing education, nursing research and nursing administration, the implications are:

### Nursing Practice

- Nurse should assess the level of oral mucositis among the cancer patients undergoing radiation therapy.
- Nurses should practice application of honey on oral mucositis before and after radiation therapy to reduce the radiation induced oral mucositis.
- Nurses should monitor the patients frequently on oral mucositis and its changes due to application of honey.

### Nursing Education

- The nurses should be trained to apply honey on oral mucositis among cancer patients.
- The nurses should be taught about the assessment of oral mucositis assessment scale.
- The nurses to be involved in various training sessions about recent changes in evidence based practices and to ensure update of their knowledge and practice.

### Nursing Administration

- The nurse administrator should plan for an in service education for nursing personnel regarding prevention of oral mucositis among cancer patients undergoing radiation therapy.
- Nurse administrator should implement protocol in using pure honey as preventive measures for the prevention of radiation induced oral mucositis.
- Nurse administrator should evaluate the nursing personal in assessment of oral mucositis assessment scale for the patients undergoing radiation therapy.

### Nursing Research

- The nursing research has to be carried to evaluate the effect of honey on oral mucositis among patients undergoing radiation therapy.
- Nursing research helps the nursing personnel to apply evidence based practices into clinical practice to improve the quality of care.

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