

Efficacy of Cryotherapy on Oral Mucositis Prevention among Patients with Head and Neck Cancers Who Undergoing Radiotherapy

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Abstract: Mucositis is an important adverse effect of cancer treatment. The aim of this study was to identify the efficacy of cryotherapy on oral mucositis prevention among patients with head and neck cancers who undergoing radiotherapy. **Subjects and Methods:** quasi-experimental design was conducted on 60 head and neck cancer patients who underwent radiotherapy. The patients were randomly divided into two study and control groups of 30 each. The patients in the study group received instructions for sucking ice cubes before and after each radiotherapy session for five minutes during the study period. Oral assessment and oral mucositis grading as well as its severity were evaluated on the 1st (first), 7th (midst), and 14th (latest) days of the radiotherapy. Four tools were used for data collection: the first tool was questionnaire including sociodemographic and medical data. The second tool was World Health Organization (WHO) Mucositis Scale. The third tool was Patient- Judged Mucositis Grading Scale. The fourth tool was Oral Assessment Guide Scale. **Results:** According to the WHO based oral mucositis scale, in the midst day ((7th) of radiotherapy, the percentage of oral mucositis with grade two in the study group (20%) was significantly lower than the control group (46.7%; $P < 0.001$). The percentage of oral mucositis in the study group based on the Patient-Judged Oral Mucositis Scale (10% & 16.7% respectively) was lower than the control group (60% & 50% respectively) at the midst (7th) and latest (14th) day of radiotherapy. The findings of this study indicated that patients who underwent cryotherapy had less severe oral mucositis based on both WHO ($P < 0.001$) and patient oral mucositis scales ($P < 0.001$). **Conclusion:** The results of this research concluded that there was significant difference was observed in mucositis intensity between the study and control groups, patients using ice cubes during radiotherapy sessions felt more comfort in their oral cavity.

Keywords: Cryotherapy, Ice, Mucositis, Pain, Radiotherapy

I. Introduction

Head and neck cancer refers to a group of biologically similar cancers that start in the lip, oral cavity (mouth), nasal cavity (inside nose), paranasal sinuses, pharynx and larynx. There are 0.5 million new cases a year worldwide [1]. [2, 3] reported that nowadays, head and neck cancers have become a major field of attention especially among the dental society. Annual worldwide incidence rate is more than half a million cases.

Head and neck cancers often spread to the lymph nodes of the neck, and this is often the first and sometimes only sign of the disease at the time of diagnosis. Head and neck cancer is strongly associated with certain environmental and lifestyle risk factors including smoking, alcohol consumption, ultra violet light, particular chemicals used in certain workplaces, and certain strains of viruses, such as human papillomavirus. These cancers are frequently aggressive in their biologic behavior; patients with these types of cancer are at a higher risk of developing another cancer in the head and neck area [2]

Head and neck cancer is highly curable if detected early, usually with some form of surgery, but radiation therapy may also play an important role, while chemotherapy is often ineffective. One of the common acute adverse effects of cancer treatment is mucositis, which is manifested in 80% of patients with head and neck cancers undergoing radiotherapy and a considerable number of patients receiving chemotherapy. Mucositis is defined as a painful inflammation and ulceration of mucous membranes. Severe pain may cause trouble for the patient in speaking, eating, or even mouth opening [2, 3].

Oral mucositis is considered an acute inflammation caused by the necrosis of the basal layer of the oral mucosa [4]. It is one of the most common oral complications associated with cancer treatment (chemotherapy and/or radiotherapy). The more important clinical features are erythema and/or ulceration [5], which may extend from the mouth to the rectum [6]. It can induce several life-threatening complications such as intestinal obstruction and perforation [7].

As well as, Oral Mucositis symptoms is ranging from mild pain to severe ulceration of the oral mucosa, oral mucositis can have serious adverse effects on patient quality of life [8]. Mucositis can lead to poor nutrition, and may require the use of total parenteral nutrition if mouth sores are severe enough to prevent the patient from

eating and drinking [10]. Oral ulcers place immunocompromised patients at an increased risk for septicemia. Mucositis can cause significant pain, often requiring the use of narcotics or patient-controlled analgesia. Mucositis has also been associated with increased length of hospital stays and delays in cancer treatment [9].

Treatment of mucositis is mainly based on supportive therapies, i.e., oral hygiene, consumption of adequate liquids, and application of mouth washes. Patients are recommended to avoid alcohol, citrus fruits, and hot foods. Related studies have introduced various substances and agents as effective medications for inhibiting or limiting signs and symptoms of mucositis. In this regard, cryotherapy has been introduced as an effective therapy, but the evidence that it prevents mucositis is still inadequate and unreliable [9].

Cryotherapy is a treatment modality based on the application of low temperatures on a body part. The purpose of this treatment is to reduce inflammation, cellular metabolism, pain and spasm and increase vasoconstriction and cellular survival [11]. As well as oral cryotherapy is a cost-effective and easily implemented nursing intervention that is well-tolerated by patients [10, 12]. In spite of, the most common adverse effects reported were headache and nausea [13].

Patients should be given small ice cubes that can be easily moved around in the mouth without causing irritation. Ice should be replenished as it melts, and patients should be instructed to move the ice in an attempt to keep the entire oral cavity cold [12].

Significance of the study

Despite the significant morbidity associated with mucositis, and the wide variety of prophylactic agents available, there is little consistency among institutions, and many commonly used interventions are not evidence-based [8]. As well as, although cryotherapy has shown some positive effects in preventing mucositis, there are still some shortcomings for this method such as vague method of ice chip application, limited number of supporting studies which are predominantly designed on chemotherapy, and lack of investigation in patients undergoing radiotherapy. Therefore, this study was conducted to evaluate the efficacy of cryotherapy on oral mucositis prevention among patients with head and neck cancers who undergoing radiotherapy.

Aim of the Study: The aim of the current study is to identify the efficacy of cryotherapy on oral mucositis prevention among patients with head and neck cancers who undergoing radiotherapy.

Operational Definition:

- Efficacy is the ability to produce specific result or to exert a specific measurable influence.
- Cryotherapy is a treatment modality based on the application of low temperatures (ice chips) on a body part (mouth)
- Oral Mucositis is defined as a painful inflammation and ulceration of mucous membranes in oral cavity.

Research Hypothesis: The following research hypotheses are formulated in an attempt to achieve the aim of the study:

- Subject who receive cryotherapy (study group I) will show improvement in mucositis prevention compared to subjects who do not receive it (control group II).

II. Subject and Methods

II.1 Research Setting

The current study conducted in radiotherapy unites of Clinical Oncology Department of Menoufia University Hospital.

II.2 Research Design: The current study utilized quasi-experimental design.

II.3 Subjects

A sample of 60 patients was recruited based on 60 % suffering from head and neck cancers undergoing radiotherapy. A patient of both sexes that was available during the time of data collection, in the previously mentioned setting was selected according to the following criteria:

- Partial or complete exposure of head and neck to radiation;
- Receiving a minimum dose of 2500 – 3000 cGy in each radiotherapy session;
- Starting radiotherapy sessions at the beginning of the study and continuing constantly during the next two weeks

Exclusion criteria included:

- Existence of oral mucositis;
- Existence of systemic diseases or taking any type of medication affecting the oral condition
- Patients under 15 and over 55 years of age.
- A sample of 60 patients selected randomly and divided alternatively into two equal groups; 30 for each group:
- Study group (1): instructed for standard oral care for mucositis (use of a soft toothbrush with nonabrasive toothpaste and dental floss twice a day) plus sucking ice cubes before and after each radiotherapy session for five minutes during the study period.
- Control group (2): exposed to routine hospital care for mucositis management as well as received instructions for standard oral care (use of a soft toothbrush with nonabrasive toothpaste and dental floss twice a day).

II.4 Variables

The independent variable is cryotherapy, while the dependent variable is the mucositis among patients with head and neck cancers undergoing radiotherapy

II.5 Tools,

Four tools used for data collection, based on review of related literature to evaluate the efficacy of cryotherapy on oral mucositis prevention among patients with head and neck cancers who undergoing radiotherapy.

These tools are:

II.5.1 Tool 1, Questionnaire including sociodemographic and medical data it was developed by researchers following an extensive, relevant literature review of oral mucositis (OM) and radiotherapy. This form was comprised of demographic data, factors that affect OM, disease-specific properties and questions about the patient that might influence the development of OM after radiotherapy. As the following, the items included in the form were as follows: age and sex of the patient, systemic diseases, oral prosthesis, smoking and drinking status, caries, regular brushing habits, mouth dryness and the status of the sensation of taste.

II.5.2 Tool 2, World Health Organization (WHO) Mucositis Scale, it is one of the simplest established grading systems that incorporates both subjective and objective criteria. Based upon clinical examination four distinct stages/grades can be identified which have been given 0 to 4 mucositis scores. Oral intake is maintained in grade 1 and 2 however compromised in higher grades [14].

II.5.3 Tool 3, Patient- Judged Mucositis Grading Scale, it is a modified version of the WHO Mucositis Grading Scale originally developed by [15] in the US and has also been used by [16] ; [17]. It involves consideration of the general physical and nutritional status of the patient as well as an inspection of the oral cavity. Patient-judged mucositis grades have been used to measure the incidence and severity of OM. Its content is the same as the WHO scale for mucositis, however the phrases have been modified for patient comprehension so the patients recorded their symptoms.

II.5.4 Tool 4, Oral Assessment Guide Scale (OAGS), Eilers' OAGS uses eight categories to assess radiotherapy-related changes: voice, swallowing, lips, tongue, saliva, mucous membranes, gingival, and teeth or dentures. Assessment changes are graded on a severity scale of 1–3, with 3 being the worst. The total score on the OAG ranges from 8, which is normal for all categories, to 24, which signifies breakdown in all categories. The researchers have used this tool to assess the oral status of all patients before the intervention [18].

III. Methods

1. Permission to carry out the study from responsible authorities and participants after explanation of the purpose of the study is done.
2. The tool I that is constructed by the researcher after reviewing of the relevant literature. Content validity is tested by five experts in the field to ascertain its relevance and completeness, as well as, is tested for validity and reliability using test-retest method. The other three adopted tools II, III, and IV, are used as itself without any change and its validity and reliability have been established in several studies.
3. Data collection was extended from the first August 2013 to the first of November 2014.
4. Patients consent for participation in the study was obtained after explanation of the purpose of the study and the confidentiality was assumed.

5. A pilot study was conducted on 10% of study sample (6 patients) to evaluate the constructed tools for clarity and applicability then necessary modification carried out. The results of the pilot study are excluded from the study.
6. Each patient who agrees to participate in the study and fulfilling the inclusion criteria was interviewed individually by the researcher in radiotherapy unite of Clinical Oncology Department.
7. The study sample was selected randomly and divided alternatively into two equal groups, study group (1) and control group (2).
8. The study group (1) instructed for standard oral care for mucositis (use of a soft toothbrush with nonabrasive toothpaste and dental floss twice a day) plus sucking ice cubes before and after each radiotherapy session for five minutes during the study period.
9. The control group (2) received instructions for standard oral care (use of a soft toothbrush with nonabrasive toothpaste and dental floss twice a day) and was left to routine hospital care for mucositis.
10. Three individually interview was done for data collection. The first interview is done at the first day of the radiotherapy sessions to collect baseline data by using tool I, II, III, and IV. The second interview and the third interview are done at the midst (7th day) and the latest (14th day) of radiotherapy sessions
11. The comparison were done between two groups

IV. Results

Table 1 shows sociodemographic characteristics of both study and control groups. The majority of both study and control groups were male (73.3% & 73.3% respectively), were secondary education (46.7% & 63.7% respectively), and were married (73.3% & 86.7% respectively). It is also observed that, most of the patients in the study and control groups had manual work (36.7% & 33.3% respectively) and had not smoked (60% & 63.3% respectively). As well as, the majority of both study and control groups had larynx tumor (46.7% & 43.3% respectively). No statistical significant differences were found between study and control group regarding sociodemographic data.

Table 2 shows the distribution of mucositis severity according of WHO mucositis scale for both study and control group. It is observed that the majority of the study group had none and grade one mucositis in both midst and latest day of radiotherapy (80% & 100% respectively) but the majority of control group had grade two of oral mucositis in midst and latest day of radiotherapy (46.7% & 90% respectively). There were statistically significant differences between study and control group regarding mucositis severity grades at two times interval (midst & latest) day of radiotherapy; where p- value were < 0.001.

Table 3 shows that the distribution of patient self assessment of oral mucositis for both study and control group in three times interval of radiotherapy. It is observed that the majority of the study group had no incidence of oral mucositis in the midst and latest day of radiotherapy (90% & 83.3% respectively) but in the control group had mild discomfort in the midst and latest day of radiotherapy (60% & 50% respectively). There were statistically significant differences between study and control group regarding patient self assessment of oral mucositis at two times interval (midst & latest) day of radiotherapy; where p- value were < 0.001.

Table 4 shows mean score of WHO mucositis grading and patient-judged mucositis grading for both study and control group in three times interval of radiotherapy. It is observed that there were low mean score for study group (0.10 ± 0.30 & 0.16 ± 0.37 respectively) rather than control group (1.40 ± 0.49 & 1.36 ± 0.61 respectively) in midst and latest day of radiotherapy regarding both patient- judged mucositis grading as well as WHO mucositis grading. There were statistically significant differences between study and control group regarding two mention items at two times interval (midst & latest) day of radiotherapy; where p- value were < 0.001

Table 5 shows the distribution of pain incidence for both study and control group in three times interval of radiotherapy. It is observed that the majority (100%) of study and control had no pain pre intervention and there were statistically significant differences between study and control group regarding pain incidence after intervention at two times interval (midst & latest) day of radiotherapy, where p - value were < 0.001.

Table 6 shows the distribution of mouth and teeth care, mouth wash, brushing habit for both study and control group in three times interval of radiotherapy. It is observed that there were statistically significant differences between study and control group regarding mouth and teeth care, mouth wash, brushing habit, at midst day of radiotherapy; where p- value were < 0.001. In addition to, there were statistically significant differences between study and control group regarding mouth wash, and brushing habit, at latest day of radiotherapy; where p- value were < 0.001.

Table 7 shows the distribution of method to reducing mucositis. It is observed that the majority (100%) of study using method of Sucking ice cubes at two times interval (midst & latest) day of radiotherapy compared to 0 % of the control group in two previous mentioned intervals and there were statistically significant differences between study and control group regarding method of reducing mucositis at two times interval (midst & latest) day of radiotherapy; where p- value were < 0.001.

Table (1) Sociodemographic characteristics of both study and control groups

	Study (n=50)		Controls (n=50)		Test of significance	P value
	no	%	no	%		
Age	42.93±6.51		41.63±4.97		t=0.86	0.389
Mean ±SD						
Sex					-	-
Male	22	73.3	22	73.3		
Female	8	26.7	8	26.7		
Marital status					$\chi^2=2.33$	0.506
Married	22	73.3	26	86.7		
Single	2	6.7	2	6.7		
Divorced	3	10.0	1	3.3		
Widow	3	10.0	1	3.3		
Education					$\chi^2=1.95$	0.583
Illiterate	3	10.0	3	10.0		
Read& write	8	26.7	5	16.7		
Secondary	14	46.7	19	63.3		
High	5	16.7	3	10.0		
Occupation					$\chi^2=0.84$	0.838
Farmer	6	20.0	7	23.3		
Manual Work	11	36.7	10	33.3		
Administrative work	8	26.7	10	33.3		
Housewife	5	16.7	3	10.0		
Site of tumour					$\chi^2=2.10$	0.717
Lips	4	13.3	2	6.7		
Oral cavity	3	10.0	6	20.0		
Neck	8	26.7	7	23.3		
Pharynx	1	3.3	2	6.7		
Larynx	14	46.7	13	43.3		
Smoking					$\chi^2=0.07$	0.791
Yes	12	40.0	11	36.7		
No	18	60.0	19	63.3		

Table (2) The distribution of mucositis severity grades according to WHO Mucositis scale for both study and control group

Mucositis severity grades according to WHO scale	Study (n=30)		Controls (n=30)		χ^2 Test	P value
	no	%	no	%		
<u>1st day of radiotherapy:</u>	30	100.0	30	100.0	-	-
• 0 and 1	0	00.0	0	0.00		
• 2	0	00.0	0	0.00		
• 3						
<u>Midst day of radiotherapy:</u>	24	80.0	2	6.7	35.81	<0.001
• 0 and 1	6	20.0	14	46.7		
• 2	0	00.0	14	46.7		
• 3						
<u>Latest day of radiotherapy:</u>	30	100.0	1	3.3	56.12	<0.001
• 0 and 1	0	00.0	27	90.0		
• 2	0	00.0	2	6.7		
• 3						

Table (3) Distribution of patient self assessment of oral mucositis for both study and control group in three times interval of radiotherapy

Patient grading mucositis	Study (n=30)		Controls (n=30)		χ^2 Test	P value
	n	%	no	%		
1st day of radiotherapy :						
None	3	100.0	30	100.0	-	-
Mild discomfort	0	00.0	0	00.0		
Definite discomfort	0	00.0	0	00.0		
Sever discomfort	0	00.0	0	00.0		
Midst day of radiotherapy:						
None	2	90.0	0	00.0	49.71	<0.001
Mild discomfort	3	10.0	18	60.0		
Definite discomfort	0	00.0	12	40.0		
Sever discomfort	0	00.0	0	00.0		
Latest day of radiotherapy :						
None	2	83.3	2	6.7	37.59	<0.001
Mild discomfort	5	16.7	15	50.0		
Moderate discomfort	0	00.0	13	43.3		
Sever discomfort	0	00.0	0	00.0		

Table (4) Mean score of WHO mucositis grading and patient- judged mucositis grading and for both study and control group in three times interval of radiotherapy

WHO Mucositis grading	Study (n=30)	Controls (n=30)	Kruskal-wallis	P value
1st day of radiotherapy	-	-	-	-
Midst day of radiotherapy	0.20 ± 0.40	1.40 ± 0.62	5.89	<0.001
Latest day of radiotherapy	-	1.03 ± 0.31	-	-
Patient- Judged Mucositis Grading				
1st day of radiotherapy	-	-	-	-
Midst day of radiotherapy	0.10 ± 0.30	1.40 ± 0.49	6.75	<0.001
Latest day of radiotherapy	0.16 ± 0.37	1.36 ± 0.61	6.01	<0.001

Table (5) Distribution of pain incidence for both study and control group in three times interval of radiotherapy

Pain incidence	Study (n=30)		Controls (n=30)		χ^2 Test	P value
	no	%	no	%		
Pain in mouth						
1st day of radiotherapy :						
• Yes	0	00.0	0	00.0	-	-
• No	30	100.0	30	100.0		
Midst day of radiotherapy						
• Yes	2	6.7	25	83.3	36.62	<0.001
• No	28	93.3	5	16.7		
Latest day of radiotherapy						
• Yes	3	10.0	12	40.0	7.20	<0.007
• No	27	90.0	18	60.0		

Table (6) Distribution of Mouth and teeth care, Mouth wash, Brushing habit and Tooth status for both study and control group in three times interval of radiotherapy

Mouth and teeth care	Study (n=30)		Controls (n=30)		χ^2 Test	P value
	no	%	no	%		
1st day of radiotherapy :						
• Yes	5	16.7	4	13.3	0.13	FE 1.0
• No	25	83.3	26	86.7		
Midst day of radiotherapy:					32.29	<0.001
• Yes	30	100.0	7	23.3		
• No	0	0.0	23	76.7		
Latest day of radiotherapy:					-	-
• Yes	30	100.	30	100.0		
• No	0	0.0	0	0.00		
Mouth wash use						
1st day of radiotherapy :					0.07	0.787
• Non	10	33.3	11	36.7		
• One	20	66.7	19	63.3		
Midst day of radiotherapy					43.05	<0.001
• Non	0	0.0	11	36.7		
• One	4	13.3	18	60.0		
• More than one	26	86.7	1	3.3		
Latest day of radiotherapy:					42.85	<0.001
• Non	0	0.0	2	6.7		
• One	0	0.0	23	76.7		
• More than one	30	100.0	5	16.7		
Brushing habit						
1st day of radiotherapy :					1.07	0.301
• Non	16	53.3	12	40.0		
• One	14	46.7	18	60.0		
Midst day of radiotherapy					45.85	<0.001
• Non	0	0.0	11	36.7		
• One	3	10.0	18	60.0		
• More than one	27	90.0	1	3.3		
Latest day of radiotherapy:					29.59	<0.001
• Non	0	0.0	2	6.7		
• One	4	13.3	23	76.7		
• More than one	26	86.7	5	16.7		

Table (7) Distribution of method to reducing mucositis for both study and control group in three times interval of radiotherapy

Method of reducing Mucositis	Study (n=30)		Controls (n=30)		χ^2 Test	P value
	no	%	no	%		
1st day of radiotherapy :					0.41	0.519
• Medication	25	83.3	23	76.7		
• Others	5	16.7	7	23.3		
Midst day of radiotherapy:					60.0	<0.001
• Medication	0	0.0	23	76.7		
• Sucking ice cubes	30	100.0	0	0.0		
• Others	0	0.0	7	23.3		
Latest day of radiotherapy:					60.0	<0.001
• Medication	0	0.0	28	93.3		
• Sucking ice cubes	30	100.0	0	0.0		
• Others	0	0.0	2	6.7		

V. Discussion

Discussion of the results is presented in the following sequence: (a) Biosociodemographic characteristics of the sample. b) The efficacy of cryotherapy on mucositis prevention among patients with head and neck cancers undergoing radiotherapy.

The result of the present study revealed that there were no statistical significant differences in the basic data between the study and control groups as regards to age, sex, marital status, education, and occupation.

The findings of the current study revealed that the mean age of the study group was 42.93 years and the mean age of control group was 41.63 years. This result is in agreement with [19]. That reported people over 40 are at higher risk for head and neck cancer. As well as, [20]. who reported that average ages of the patients in the control and experimental groups were 49.1 ± 15.4 and 42.9 ± 14.9 years, respectively. On the contrary with [21]. Observed that head and neck cancers are diagnosed more often among people over age 50 than they are among younger people. This may be due to old age had low immunity and poor nutritional status which considered risk for head and neck cancer.

Concerning to sex, the result of the present study revealed that more than half of both groups were male. This result is in accordance with [21]. Reported that head and neck cancers are nearly twice as common among men as they are among women. As well as, [19]. who reported that out of 40 patients of the study, 23 (57.5%) were male. Moreover, Cancer Net Editorial Board, (2014) added that men are two to three times more likely than women to develop head and neck cancer. However, the rate of head and neck cancer in women has been rising for several decades.

The efficacy of cryotherapy on oral mucositis prevention among patients with head and neck cancers who undergoing radiotherapy.

Oral cryotherapy is a cost-effective and easily implemented nursing intervention that is well-tolerated by patients [10,12]. Moreover, [9]. Reported that there are several studies have assessed the effect of oral cryotherapy on development of mucositis. As well as, A Cochrane systematic review in 2002 reported that among six prophylactic agents, ice chips were the only effective agent in prevention of oral mucositis. However, the authors added that due to the limited number of studies and subjects and their special conditions, this is not strong and reliable evidence.

The current study showed that there were no statistically significant differences between study and control group concerning mucositis before cryotherapy versus after cryotherapy as shown in the following:

The current study showed that there was the majority of the control group had grade two of mucositis at the midst and latest day of radiotherapy so this finding of the study is on the contrary to [22]. Studied more than 6,000 patients with squamous cell carcinoma of the head and neck who received radiotherapy with or without chemotherapy and reported that the overall incidence of mucositis in this patient was 80 to 100%, with 25-45 % of cases being grade 3/4. This may be control group not received any intervention and education about prevention of mucositis

The current study showed that there were statistically significant differences between study and control group regarding pain incidence at two times interval (midst & latest) day of radiotherapy, this finding of the study was emphasized with [19]. **Who** reported that the current study showed that cryotherapy can reduce pain severity and symptoms of mucositis in patients with head and neck cancer, undergoing radiotherapy. Oral cryotherapy has been shown to be effective in preventing and/or reducing the severity of oral mucositis when used with patients receiving certain chemotherapy regimens or radiotherapy and also tissue cooling has traditionally been used to relieve both acute and chronic pain [23, 24]. Other results of [25]. Show that cooling of the oral mucosa reduced the development of oral mucositis and alleviated oral pain. As well as, this finding of the study was emphasized with [19]. Who reported that the increase of pain severity in the control group was statistically significant ($p < 0.001$), changes in the experimental group were not ($p = 0.155$).

The current study showed that there were statistically significant differences between study and control group regarding mouth and teeth care, mouth wash, brushing habit this finding in the same line with [26]. Who reported that patients with poor oral hygiene are more susceptible to mucositis and have longer recovery times? Dodd has assessed mucositis risk factors and observed increased mucositis in patients with poor oral hygiene and also strict oral care to reduce potential pathogenic microorganisms is mandatory for mucositis prevention and management. It is essential to educate the patient to adopt a standardized protocol of oral hygiene [27, 28, 29]. Before the chemotherapy and/or radiotherapy [30]. The maintenance of good oral hygiene reduces pain, bleeding, infections, and risk for possible dental complications [7]. And also consistent with [31]. Who studied the role of basic oral care and good clinical practice principles in the management of oral mucositis. they found the basic oral care group is one of eight subcommittees functioning within the mucositis study group.

Therefore, the patient and family, doctors, and nurses should be aware of the importance of having a good oral hygiene during the cancer treatment; frequent assessment of the oral cavity is recommended, especially for those patients at high risk to in the same line tooth brushing is necessary at least twice a day. The patient should be advised to use dental floss daily and rinse the mouth with clean water. Use of oral solutions, such as saline solution, sodium bicarbonate or a mixture of both, can also be recommended [32]. Moreover, consumption of spice foods, tobacco and alcohol, use of oral mouthrinses containing alcohol should be avoided [33, 28, and 30]. And adequate hydration should be maintained [33, 29].

VI. Conclusion

The researchers found that oral cryotherapy has a significant contribution to the protection of oral health by reducing mucositis score according to the WHO mucositis scale, especially on the 7th and 14th days. Nurses' awareness of how cryotherapy can affect patients and options for resolving problems will enable them to provide a higher standard of individualized care.

VII. Recommendations

Based on the results of this study, the researchers are recommended using of cryotherapy and educational program to decrease incidence of mucositis among patient with head and neck cancer. As well as, replication of the study with larger sample must be considered.

References

- [1]. Audrey, S. Rousseau, A. and B.Cécile, Head and Neck: Squamous cell carcinoma: an overview, *Atlas Genet Cytogenet Oncol Haematol*, 2(2) 2012, 145-155.
- [2]. Ridge, JA. Glisson, BS. And Lango ,MN. Head and Neck Tumors (Hoskins, WJ, 2008)
- [3]. Sonis, ST. Oral Mucositis in Cancer Therapy, *J Supportive Oncology*, 2(12) 2004, 3-8.
- [4]. Chiappelli, F The molecular immunology of mucositis: Implications for evidence-based research in alternative and complementary palliative treatments, *Evid Based Complement Alternat Med*, 2 (2)2005, 489-94.
- [5]. Epstein, JB. And Schubert, MM. Oral mucositis in myelosuppressive cancer therapy, *Oral Surg Oral Med Oral Radiol Endod*, 88(23)1999, 273-6.
- [6]. Gibson, RJ. Bowen, JM. And Keef, DM. Technological advances in mucositis research: new insights and new issues, *Cancer Treat Rev*, 34 (13) 2008,476-82.
- [7]. Rubenstein, EB. Peterson, DE. Schubert, M. Keefe, D. McGuire, D. and Epstein, J . Clinical practice guidelines for the prevention and treatment of cancer therapy-induced oral and gastrointestinal mucositis, *Cancer*, 100 (13) 2004, 2026-46.
- [8]. Worthington, H.V. Clarkson, J.E. Bryan, G. Furness, S. Glenny, A.M. Littlewood, A. and Khalid, T. Interventions for preventing oral mucositis for patients with cancer receiving treatment (Review), *The Cochrane Collaboration* (2011)
- [9]. Worthington, HV. And Clarkson, JE. Prevention of oral mucositis and oral candidiasis for patients with cancer treated with chemotherapy: *Cochrane systemic review*, *J Dent Educ*, 66 (32)2002, 903- 911.
- [10]. Svanberg, A. Ohrn, K. and Birgegard, G. Oral cryotherapy reduces mucositis and improves nutrition- a randomized controlled trial, *Journal of Clinical Nursing*, 19 (21) 2010, 2146-2151.
- [11]. Thai, KE. And Sinclair, RD. Cryosurgery of benign skin lesions, *Australas J Dermatol*, 40(11) 1999, 175- 84.
- [12]. Katranci, N. Owayolu, N. Owayolu, O. and Sevinc, A. Evaluation of the effect of cryotherapy in preventing oral mucositis associated with chemotherapy- a randomized controlled trial, *European Journal of Oncology Nursing*, 16(5) 2012, 339-344.
- [13]. Nikoletti, S. Hyde, S. Shaw, T. Myers, H. and Kristjanson, L. Comparison of plain ice and flavoured ice for preventing oral mucositis associated with the use of 5 fluorouracil, *Journal of Clinical Nursing*, 14(4)2005, 750-753.
- [14]. World Health Organization, Handbook for reporting results of cancer treatment (Geneva: WHO, :15-22, 1979).
- [15]. Mahmood, DJ. Dose, AM. Loprinzi, CL. Veeder, MH. Athmann, LM. And Therneau, TM. Inhibition of fluorouracilinduced stomatitis by oral cryotherapy, *J Clin Oncol*,9(3) 1991,449-52.
- [16]. Papadeas, E. Naxakis, S. Riga, M. and Kalofonos, C. Prevention of 5-fluorouracil- related stomatitis by oral cryotherapy: A randomized controlled study, *European Journal of Oncology Nursing*, 11(1) 2007, 60-5.
- [17]. Karagozolu, S. and Ulusoy, M. The effect of oral cryotherapy on the development of mucositis, *Journal of Clinical Nursing*, 14(6) 2005,754-65.
- [18]. Eilers, J. Sonis, S. Epstein, J. LeVegue, F. Liggett, W. Mulahga, M. and Wittes, J. Validation of a new scoring system for the assessment of clinical trial research of oral mucositis induced by radiation or chemotherapy, *Cancer*, 85 (23) 1999,2103-2113.
- [19]. Cancer Net Editorial Board. (2014). Head and Neck Cancer: Risk Factors and Prevention. Available at: <http://www.cancer.net/cancer-types/head-and-neck-cancer/risk-factors-and-prevention>. Retrieved at: 1/9/2014
- [20]. Kakoei ,S. Ghassemi ,A. and Nakhaee, N. Effect of cryotherapy on oral mucositis in patients with head and neck cancers receiving radiotherapy, *International Journal of Radiation Research*, 11(2) 2013,21-30.
- [21]. Vera-Llonch, M. Oster, G. Ford, CM. Lu, J. and Sonis, S. Oral mucositis and outcomes of allogeneic hematopoietic stem-cell transplantation in patients with hematologic malignancies, *Support Care Cancer*, 15(5) 2007,491-496.
- [22]. Trotti, A. Bellm, LA. Epstein, JB. Frame, D. Fuchs, HJ. Gwede, CK. Komaroff, E. Nalysnyk L. and Zilberberg, MD. Mucositis incidence, severity and associated outcomes in patients with head and neck cancer receiving radiotherapy with or without chemotherapy: a systematic literature review, *Radiotherapy Oncology*, 66(32) 2003, 253- 62.
- [23]. Cooper, SM. and Dawber, RPR. The history of cryosurgery, *J R Soc Med*.94 (4) 2001, 196-201.
- [24]. Farah, CS. and Savage, NW. Cryotherapy for treatment of oral lesions, *Aus Dent J.*, 51(1) 2006,2-5.
- [25]. Svanberg, A. O`hrn, K. and Birgega`rd, G. Unexpected 5 year survival benefit in patients given oral cryotherapy during conditioning for stem cell transplantation. A prospective randomized study, *Blood*. (ASH Annual Meeting Abstracts); 118: Abstract 4559, 2011
- [26]. Dodd, MJ. Miaskowski,C. Shiba, GH. Dibble, SL. Greenspan, D. and MacPhail, L. Risk factors for chemotherapy-induced oral mucositis: Dental appliances, oral hygiene, previous oral lesions, and history of smoking, *Cancer Invest*, 17(4) 1999, 278-84.
- [27]. Lionel, D. Christophe, L. Marc, A. and Jean-Luc, C. Oral mucositis induced by anticancer treatments: physiopathology and treatments, *TherClin Risk Manag*, 2 (1) 2006, 159-68.
- [28]. Stone, R. Flidener, MC. and Smiet, AC. Management of oral mucositis in patients with cancer, *Eur J Oncol Nurs*, 9(3) 2005, 524-32.
- [29]. Peterson, DE. Bensadoun, RJ. And Roila, F. Management of oral and gastrointestinal mucositis: ESMO clinical recommendations, *Ann Oncol*, 19(4) 2008, 122-5.
- [30]. Scully, C. and Epstein, JB. Oral health care for the cancer patient, *Eur JCancer B Oral Oncol*, 32B (45) 1996, 281-92.
- [31]. McGuire, DB. Correa, ME. Johnson, J. and Wienandts, P. The role of basic oral care and good clinical practice principles in the management of oral mucositis, *Support Care Cancer*, 14(6) 2006, 541-547.
- [32]. Epstein, J.B. and Schubert, M.M. Managing pain in mucositis. *Semin OncolNurs*, 20 (5) 2004, 30-7.
- [33]. Keefe, DM. Schubert, MM. Elting, LS. Sonis, ST. Epstein, JB. And Raber-Durlacher, JE. Updated clinical practice guidelines for the prevention and treatment of mucositis, *Cancer*, 109(45) 2007, 820-31.