

Influences of oral cryotherapy on mucositis prevention in cancer patients with chemotherapy

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ABSTRACT

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Background: A mucositis is the most common problem in a chemotherapy treatment and becomes a severe problem for patients who receive several cycles of chemotherapy. Effects of an oral mucositis that is not treated immediately or is less effective can affect quality of life of the patients. Pain experienced by them can cause problems in the mouth, for example inability to tolerate food or fluids (dysphagia) and decreases of nutritional status.

Objective: This study is to identify effectiveness of oral cryotherapy on prevention of the mucositis in cancer patients with chemotherapy.

Methods: This study used a quasi-experimental method with a pre and post-test for a control group. Its samples were 32 patients for an intervention group and a control group, taken by using a consecutive sampling technique. The mucositis was measured by using questionnaires of Oral Assessment Guide (OAG), and the obtained data was analysed by the Wilcoxon and Mann Whitney test.

Results: This study found that 24 respondents were not affected by the mucositis at $p\text{-value}=0.008$ ($p<0.05$) in the post intervention in the intervention group, and there was a difference in values of the mucositis measured by the OAG at $p\text{-value}=0.003$ ($p<0.05$) in the post intervention in the both groups.

Conclusion: The oral cryotherapy could prevent the mucositis in cancer patients with chemotherapy.

Latar Belakang: Mukositis merupakan masalah yang paling umum dalam pengobatan kemoterapi dan menjadi masalah yang sangat serius bagi pasien yang menerima beberapa siklus pengobatan kemoterapi. Efek penanganan mukositis oral yang tidak segera ditangani atau kurang efektif akan mempengaruhi kualitas hidup pasien. Rasa sakit yang dialami pasien menyebabkan ketidaknyamanan pada mulut, ketidakmampuan untuk mentoleransi makanan dan cairan (disfagia) dan sampai akhirnya mengalami penurunan status gizi.

Tujuan: Untuk mengidentifikasi efektivitas cryotherapy oral pada pencegahan dari mukositis pada pasien kanker yang sedang menjalani kemoterapi.

Metode: Penelitian ini menggunakan metode eksperimen semu dengan pre-post test dengan kelompok kontrol. Sampel adalah 32 pasien untuk kelompok intervensi dan kelompok kontrol, diambil dengan menggunakan teknik consecutive sampling. Mukositis diukur dengan menggunakan kuesioner pada Oral Assessment Guide (OAG) sedangkan data dianalisis dengan uji Wilcoxon dan uji Mann Whitney.

Hasil: Hasil menunjukkan, dalam post intervensi pada kelompok intervensi, 24 responden tidak terpengaruh oleh mukositis pada $p\text{-value} = 0.008$ ($p < 0.05$); dalam pasca intervensi pada kedua kelompok, ada perbedaan

dalam nilai mucositis yang diukur dengan OAG pada p-value = 0.003 (p <0.05).

Kesimpulan: *Cryotherapy oral dapat mencegah mucositis pada pasien kanker yang sedang menjalani kemoterapi.*

INTRODUCTION

Cancer is the second leading cause of death after cardiovascular diseases in the world. According to a report by the International Agency for Research on Cancer (IARC) in 2012, an estimated incidence of cancer in the world would be 14.1 million for new cases and 8.2 million for cases of death. Lung cancer still leads the rank of the highest incidence rate (1.82 million) followed by breast cancer (1.67 million) and colorectal (1.36 million). The highest-ranking causes of death are lung cancer (1.6 million) and followed by liver cancer (745,000) and stoma cancer (723,000).¹ Data from Indonesia basic health research (RISKESDAS) in 2013 stated that cancer prevalence in Indonesia is 14% or is estimated to be about 347,792 people. In fact, Province of D.I. Yogyakarta has the highest prevalence of cancer, about 41%.²

According to Komite Nasional Penanggulangan Kanker/national committee for cancer management (KPKN), there are various types of cancer treatment therapies including surgery, radiation therapy, chemotherapy, hormonal therapy, and immune therapy. The therapies can be given in one type or in combination depending on stages of cancer, tumour characteristics, age, health, and preferences of patients more than half of cancer patients are treated by chemotherapy.³ Chemotherapy is a type of therapy to kill cancer cells and is the most effective therapy for cancer patients. The therapy given to cancer patients aims to cure the cancer, prolong life and improve the quality of life.^{3,4}

The chemotherapy can cause side effects such as fatigue, nausea, vomiting, anorexia, myelosuppression, hair loss, mucositis, and death in severe cases, but a side effect that often occur in patients undergoing chemotherapy are the mucositis.^{4,5}

Early intervention for oral mucositis is crucial.

In this case, roles of nurses are needed because more nurse' time in providing services can provide immediate care according to patients' condition. Besides, nurses are responsible for managing chemotherapy schedules. Interventions for the mucositis need to be conducted according to the chemotherapy schedules, and the nurses are the most appropriate people to deal with these treatments. The oral mucositis occurs about 7 to 14 days after the chemotherapy.⁶ The majority of patients require chemotherapy treatment every two weeks. Patients who experience a mucositis in a previous chemotherapy cycle that is not treated immediately will experience an increase of mucositis levels in the next chemotherapy cycle.

Martin and Perez stated that oral mucositis treatment could be also conducted with oral hygiene protocols, chlorhexidine digluconates, cytoprotective agents (amifostine, sucralfate, glutamine, allopurinol, cryotherapy, growth factors, and Low-Level Laser Therapy/LLLT).⁷

Intraoral cooling therapy or oral cryotherapy had previously been reported to be effective for chemotherapy-induced mucositis.⁸ A cochrane review reported that oral cryotherapy could reduce oral mucositis of any severity in adult patients undergoing fluorouracil-based chemotherapy for solid cancers.⁹ Studies have suggested that cryotherapy can decrease a burden of chemotherapy-related to oral mucositis.¹⁰

Based on the previous studies above, this study aims to determine whether there is an effect of oral cryotherapy on decreasing levels of mucositis in cancer patients undergoing chemotherapy.

METHODS

This study was a quasi-experimental research with a pre and post test for a control group. This study was conducted in the Adam Malik General Hospital Medan on January 2018 to April 2019. Sixty four respondents were involved in this study by using a consecutive sampling. Inclusion criteria in this study were: 1) patients who were aged 18-65 years old; 2) patients who

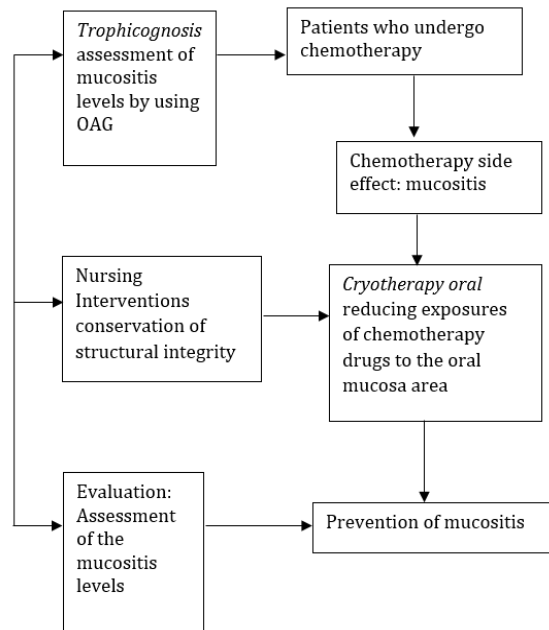
took chemotherapy treatment for the first time; 3) patients who suffered Ca Nasopharynx; 4) mucositis that had not occurred; 5) patients who had no sensitivity to ice; 6) patients who wanted to be respondents in this study; 7) respondents were fully aware and able to answer questions; 8) patients who had excellent communication .

This study applied the Oral Assessment Guide (OAG) and observation sheets of documentation in implementing the oral cryotherapy. Oral examination by using the OAG was conducted by clinical assessments including sound, swallow, lips, tongue, saliva, mucous membranes, gums, and teeth. This test had scores from 1 to 3 for each of 8 categories. A score of 1 indicated a normal condition, a score of 2 indicated a minor change in functions, and a score of 3 indicated a high damage and loss of functions of that aspects. Then the scores was added to produce mucositis scores from 8-24. The Royal Children's Hospital Australia categorized the OAG into three categories, namely category 1 with an OAG score of 8 (normal), category 2 with an OAG score of 9-16 (mild-moderate), and category 3 with an OAG score in the range 17-24 (severe mucositis). The numbers were categorized into two categories, namely no mucositis at an OAG score <10 and mucositis at an OAG score ≥10.¹¹ The OAG was applied because this instrument is commonly used to measure levels of mucositis and is easy to apply or assess.

Observation sheets in implementating the oral cryotherapy were a tool used to observe the implementation of oral cryotherapy by protocols that had been made. Checking the checklist (✓) on the observation sheets was when researchers performed according to the protocols. Putting a dash (-) on the observation sheets when the researchers did not perform according to the protocols.

A bivariate analysis in this study was used by a Wilcoxon Signed Rank test. This test was to determine differences of mucositis scores before and after oral cryotherapy in each intervention group, while a Mann-Whitney U test was used to determine differences of mucositis scores between the intervention and control group.

The conceptual framework



Ethical Consideration

This study was approved by The Research Ethics Committee, Faculty of Nursing, Universitas Sumatera Utara No. 1577/X/SP/2018.

RESULTS

Table 1. shows that an average of age of respondents in this study was 44.00 ± 5,067 in the intervention group and 44.13 ± 4,784 in the control group. Based on age grouping, the respondents were in a range of 35-54 years old, namely 71.9% in the intervention group and 96.9% in the control group. Based on gender, the respondents were dominated by men by 68.8% in the intervention group and 68.2% in the control group. Based on educational background, the respondents who graduated from high school were 71.9% in the intervention group and 7% in the control group. There were 81.3% of respondents working as entrepreneurs in the intervention group and 81.5% in the control group. Based on marital status, 90.6% were married in the intervention group and 87.5% in the control group. Most of ethnics in this study were from the Batak, namely 75.0% in the intervention group and 71.9% in the control

group. For the chemotherapy cycle, the majority of the first cycle was 71.9% in the intervention group and 58.3% in the control group.

Table 1. Characteristics of respondents

No.	Variables	Intervention group (n = 32)		Control group (n = 32)	
		f	%	f	%
1	Age	Mean: 44.00	SD : 5.607	Mean: 44.13	SD: 4.784
	18-34 years	4	12.5	1	3.1
	35-54 years	23	71.9	31	96.9
	55-64 years	5	15.6	0	0
2	Sex				
	Male	22	68.8	24	75.0
	Female	10	31.3	8	25.0
3	Education				
	Junior High School	1	3.1	5	15.6
	Senior High School	23	71.9	24	75.0
	College	1	25.0	3	9.4
4	Employment				
	Civil officer	1	3.1	0	0
	Entrepreneur	26	81.3	26	81.5
	Housewife	2	6.3	5	15.6
	No working	3	9.4	1	3.1
5	Marital status				
	Married	29	90.6	28	87.5
	Widow	3	9.4	4	12.5
6	Ethnic				
	Batak	24	75.0	23	71.9
	Java	4	12.5	6	18.8
	Aceh	1	3.1	0	0
	Malay	3	9.4	3	9.4
7	Income				
	<1 million/monthly	29	90.6	29	90.6
	>1-2 million/monthly	1	3.1	1	3.1
	>2 million/monthly	2	6.3	2	6.3
8	Chemotherapy cycle				
	cycle 1	23	78.1	18	56.3
	cycle 2	4	6.3	7	21.9
	cycle 3	5	15.6	7	21.9

Table 2 shows that the mucositis value in the intervention group before treatment had an OAG value <10 for 32 respondents and had an OAG value <10 for 29 respondents after the intervention and for 3 respondents with an

OAG value ≥10. OAG values of all respondents in the control group before treatment and after treatment were <10.12 respondents with OAG values <12, and 18 respondents were with OAG values ≥10.

Table 2. mucositis values of the intervention and control group of cancer patients with chemotherapy

Variable	Pre				Post			
	No mucositis		Mucositis		No mucositis		Mucositis	
	f	%	f	%	f	%	f	%
Intervention group	32	100	0	0	29	88.6	3	9.3
Control group	32	100	0	0	12	37.3	18	63,9

Table 3 shows that there were differences of mucositis values between before and after the oral cryotherapy measured by OAG after statistically tested by using the Wilcoxon

Signed Rank test with a mean rank of 4.50 and p=0.008 (p<0.05). Then in the control group, the mean rank was 12.06 with p=0.003 (p<0.05).

Table 3. Average scores of eight dimensions in the SF-36 (n=13)

Variable	Intervention group (N=32)			Control group (N=32)		
	Mean Rank	Z	p-value	Mean Rank	Z	p-value
(OAG) value	4.50	-2.640	0.008	12.06	-4.238	0.000

Table 4 shows that there were differences of mucositis values between the intervention group

and the control group with p=0.003 (p <0.05).

Table 4. differences mucositis values in the intervention and control group based on the Mann-Whitney u test

Variable	Median (Minimal-Maximal)	Z-value	p-value
OAG value	9.00 (8-14)	-3,007	0.003

DISCUSSION

Results of this study indicated that the number of respondents who did not experience mucositis was higher in the intervention group than in the control group. This difference was because respondents in the intervention group conducted the oral cryotherapy, a treatment designed during their chemotherapy. Also, this study showed that the oral cryotherapy in the intervention group was more effective to prevent the mucositis. It can be concluded that the oral

cryotherapy can prevent the mucositis in cancer patients with chemotherapy.

These results of this study are in line with Katrancı, Ovayolu, Ovayolu, and Sevinc’s study finding that oral cryotherapy could affect protection of oral health by reducing mucositis scores according to the WHO scale, especially on the 7th and 14th day. Oral mucositis is a common effect caused by a cancer treatment that can cause mucosal toxicity. Patients with oral mucositis experience severe pain and are

unable to eat, drink, and talk; as a result, their quality of life is impaired.¹² 30-80 % of patients undergoing chemotherapy will experience oral mucositis. Preventing or reducing incidences of the oral mucositis and its severity can help reducing pain experienced by the patients. Oral cryotherapy is a prophylactic intervention to reduce the incidences and severity of oral mucositis induced by chemotherapy.¹³

A study conducted by Svanberg stated that oral cryotherapy could significantly delay the incidences and severity of mucositis among patients treated by myeloblastic therapy before bone marrow transplantation, and it could reduce numbers of od days with i.v. opioids.¹⁴

Based on Wilcoxon test results, this study demonstrated that there were differences in the pre and post mucositis assessment of gargling with normal saline by a value of $p=0.000$. These are similar to a study conducted by Nursalam, Ertawati, and Kristyaningsih, stating that the p -value was 0.012 in the normal saline group; normal saline is effective to prevent the oral mucositis. The normal saline is a physiological fluid (according to body fluids) that functions to clean debris, does not irritate, nor does it change the pH of saliva. Because it does not change the pH of saliva, a natural buffer of the mouth will not be disturbed. The physiological mouth will be maintained because there is no irritation.¹⁵ Reducing a number of debris will reduce bacteria in the mouth. If a patient rinses with normal saline, it is expected that endurance (oral) of the patient will increase.¹⁶

The value of mucositis before and after the oral cryotherapy in this study was identified by comparing the post-test values of the mucositis levels between the intervention group and the control group by using a statistical analysis of the Mann Whitney test. Based on the analysis, it could be interpreted that there were differences in the intervention and control group with an OAG value, $p = 0.003$, given $p < 0.05$.

The results are in line with a study by Askarifar, Lakdizaji, Ramzi, Rahmani, and Jabbarzadeh, which divided the two groups: the intervention group with oral cryotherapy and

the control group by using normal saline. The results showed that on the 7th day, the severity of mucositis was less in the intervention group ($p=0.031$) than in the control group. On the 14th day, the mucositis severity was less in the intervention group ($p=0.004$) than in the control group. The study concluded that cryotherapy was more effective than mouthwash by using normal saline in preventing the mucositis.⁴

In addition, Karagozoglu and Ulusoy found that the incidences of mucositis in the intervention group were 10%, and in the control group, 50% using instruments measuring the degree of mucositis Physician-Judged Mucositis Grading. The results of the study confirmed that oral cryotherapy was adequate to prevent mucositis and effective to reduce its severity.¹⁶

CONCLUSION

The results of this study found oral cryotherapy to prevent the mucositis in cancer patients undergoing chemotherapy was effective.

CONFLICT OF INTEREST

There was no conflict of interest.

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None declare.

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