ORIGINAL RESEARCH

The Effect of Oral Care with Black Mulberry Syrup on Oral Mucositis in Patients With COPD: A Mixed Study

Sevda Korkut, RN, PhD; Songül Karadağ, RN, PhD; Salih Levent Çınar, MD

ABSTRACT

Background • Oral mucositis often affects the quality of life of patients living with Chronic Obstructive Pulmonary Disease (COPD). Its symptoms include loss of oral mucous membranes, ulceration, bleeding and pain as well as bacterial, fungal and viral infections of the oral mucosa.

Objectives • This study was carried out to investigate the effect of oral care with black mulberry syrup on oral mucositis healing in patients with COPD.

Design • This mixed study was carried out in two stages–quantitative and qualitative. The quantitative stage was conducted as a randomized controlled experimental study while the qualitative stage was conducted by in-depth interview method.

Setting • This study was conducted at the chest diseases clinic of a tertiary hospital in Turkey.

Participants • The randomized controlled experimental study was completed with a total of 40 patients who had been diagnosed with COPD and oral mucositis between March 2017 and June 2018. They were divided into intervention and control groups consisting of 20 patients each. The qualitative study was conducted on 10 patients in the intervention group.

Intervention • Patients in the intervention group gargled with 5 ml of black mulberry syrup for an average of 1 minute and swallowed it upon completion. They did this 3 times a day after meals for a period of 15 days after which they were interviewed.

Outcome Measures • The quantitative data was collected using the Patient Information Form, Oral Evaluation Guideline, and WHO Oral Mucositis Scoring Index, while the qualitative data was collected using the in-depth interview form. Patients' oral mucosa was assessed a total of 3 times during 3 interviews held on the first, seventh and fifteenth days of the study.

Results • There was a significant decrease in scores of oral mucositis of the patients in the intervention group at the second and third follow-ups. Oral mucositis of the intervention and the control groups healed at an average of 9.1 ± 2.5 days and 12.1 ± 1.4 days, respectively. In addition, oral care with black mulberry syrup was found to alleviate mucositis-related symptoms.

Conclusion • Oral care with black mulberry syrup accelerates mucositis healing and alleviates mucositis-related symptoms. (*Altern Ther Health Med.* [E-pub ahead of print.])

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In patients with Chronic Obstructive Pulmonary Disease (COPD), the presence of a chronic disease and related problems like physical/mental disability, weakness, and motor activity deterioration, along with the effects of medication, often complicate oral care. Patients tend to have poor oral health, lower quality of life than the general population, and more oral problems affecting systemic health.[1]

In addition, many metabolic, inflammatory and oxidative changes occur in patients due to COPD, leading to muscle weakness and preventing patients from performing activities of daily living (ADLs).[2] These problems in performing ADLs negatively affect patients' ability to

maintain of oral hygiene,[3] and mucositis is one of the most common resulting problems which disrupts the integrity of the oral mucosa.[4,5]

Oral mucositis, also called stomatitis, is an ulcerative and inflammatory process.[6] It can directly affect the quality of life of patients by causing major problems such as the loss of oral mucous membranes, ulceration, bleeding, pain, and bacterial, fungal and viral infections of the oral mucosa.[7] These can cause patients to experience difficulty in chewing, swallowing and speaking, and may lead to the development of biopsychosocial problems like changes in physical comfort, deterioration in body image and self-esteem, increase in duration of hospital stays and increase in hospital costs. Furthermore, since affected patients cannot be fed orally, enteral or parenteral feeding becomes necessary, increasing the experience of pain and the possibility of opioid use.[5,8] It has also been reported that patients may experience psychological problems due to oral mucositis.[9]

Pharmacological and non-pharmacological methods are used in the management of oral mucositis.[5] In recent years, non-pharmacological methods are increasingly being investigated and studies in patients with cancer have shown black mulberry molasses prevents gingival sensitivity and dysphagia, delays the formation of mucositis, and reduces the severity of mucositis.[10,11] Black mulberry is particularly effective in treating tonsillitis and healing oral and dental wounds because it contains papiriflavonal A, kuraridin, saforaflavanon D and saforaiso flavanon A, which give it good antifungal and strong antimicrobial activity. In addition, 2-arylbenzofurans, also found in black mulberry, has an antimicrobial effect on methicillin resistant staphylococci,[12] and in their study, Feng et al showed that black mulberry has a strong antioxidant effect.[13]

The vast majority of studies on oral mucositis so far have involved cancer patients receiving chemotherapy and/or radiotherapy treatment.[14-16] However, cancer patients are not the only group who are prone to oral mucositis. Many individuals may experience oral mucositis through the influence of various factors,[1] and patients with COPD are particularly susceptible.[17]

While healthy persons can easily perform routine oral hygiene care activities, patients living with chronic diseases like cancer and COPD may have difficulties doing so. In such cases, the patients require the help of caregivers and nurses. Oral care is one of the basic elements of nursing care and nurses generally play a primary role in care of mucositis.

This study hypothesized that oral care with black mulberry syrup is effective in the treatment of oral mucositis in patients with COPD.

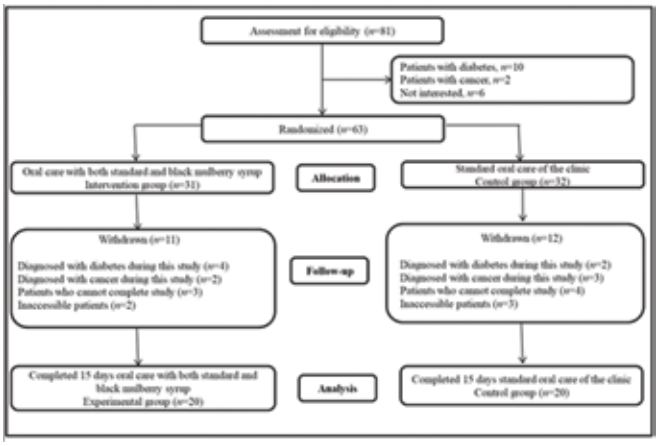
METHODS

The aim of this study was to investigate the effect of oral care with black mulberry syrup on oral mucositis healing in individuals with COPD.

Study Design and Sample

This clinical trial was carried out as a two-stage mixed methods research consisting of quantitative and qualitative studies. The quantitative study was conducted as a randomized controlled trial, while the qualitative study was carried out using the individual in-depth interview method which involved semi-structured questionnaires of patients in the intervention group.

Figure 1. Flowchart of the randomized controlled trial



Conducted at the chest diseases clinic of a tertiary hospital in Turkey, the research group for this study consisted of all patients who were diagnosed with COPD and oral mucositis between March 2017 and June 2018. For the sample size, a decrease of 38% in the study of Demir Doğan et al[10] was deemed significant. The required sample was determined to be 30 patients for each group considering this decrease, 5% type 1 error and 90% power. Patients were randomly assigned by computer-generated simple randomisation into control and intervention groups. The randomisation was conducted by an independent person not involved in the study. During the study, 81 patients who were diagnosed with COPD and oral mucositis were assessed for eligibility. 18 were deemed ineligible for not meeting inclusion criteria and in some cases, declining to participate. Therefore, 63 patients were randomly allocated to the study groups with 31 and 32 patients in the intervention and control groups, respectively (Figure 1).

However, after starting the study, 11 patients in the intervention group and 12 patients in the control group were dropped during follow-up periods. With a total of 23 patients dropped, only 40 patients remained divided equally between the intervention and control groups. Post-hoc power analysis was performed using the G*power 3.1.9.2 program software designed by Franz Faul of Universität Kiel, Germany, with 5% type 1 error with reference to healing days since the previously calculated sample size for the study could not be reached. Having determined that power equals 0.99 in this analysis, it was decided that the sample size was sufficient. Figure 1 shows a sample diagram of the study.

The criteria for participant selection were as follows: (a) able to speak and understand Turkish, (b) over 18 years of age, (c) no visual or hearing problem, (d) unimpaired time and place orientation, (e) no psychiatric disorders, (f) diagnosed with COPD, (g) developed oral mucositis, and (h) used Nystatin and/or Benzidamine Hydrochloride

Table 1. Demographic and Clinical Variables of the Intervention and Control Groups

Variable	Categories	Intervention Group n(%)	Control Group n(%)	*P* Value
Age ($x \pm SD$)		68.6 ± 9.0	70.0 ± 10.9	.838
Gender	Female	6 (30.0)	6 (30.0)	1.000
	Male	14 (70.0)	14 (70.0)	
Another Chronic Disease Condition	Yes	14 (70.0)	13 (65.0)	1.000
	No	6 (30.0)	7 (35.0)	
Type of Chronic Diseases[a]	HT	8(38.1)	11(57.8)	.562
	CHF	6(28.6)	3(15.7)	
	Others	7(33.3)	5(26.1)	

[a]Given more than one answer, percentages were shown via n

Abbreviations: HT, hypertension; CHF, chronic heart failure.

Table 2. Previous Experiences of Oral Mucositis of the Intervention and Control Groups

Variable	Categories	Intervention Group n(%)	Control Group n(%)	*P* Value
Previous Oral Mucositis Experience	Yes	12(60.0)	9(45.0)	.527
	No	8(40.0)	11(55.0)	
Previously Developed Oral Mucositis Number	2 times	4(33.3)	2(22.2)	1.000
	3 times	2(16.7)	2(22.2)	
	4 and more than 4 times	6(50.0)	5(55.6)	
Previous Oral Mucositis Intensity	Mild	1(8.3)	1(11.1)	1.000
	Moderate	7(58.4)	6(66.7)	
	Severe	4(33.3)	2(22.2)	

therapy. Patients diagnosed with cancer and diabetes as well as patients who had recurrent oral aphthae, candida stomatitis, lichen planus, pemphigus in the oral mucosa and allergic reactions to black mulberry syrup, were excluded from the study.

Measures and Instruments

All data were collected using the Patient İnformation Form, Oral Evaluation Guideline, WHO Oral Mucositis Scoring Index, and in-depth interview form.

Patient Information Form. The Patient Information Form developed by the researchers consisted of questions on the socio-demographic data of patients, their history of chronic disease(s), and their previous experience with oral mucositis.[7,10,11] The forms were filed using information collected during face-to-face interviews with the patients and by checking patients' medical files.

Oral Evaluation Guide. According to the guide developed by Eilers et al,[18] oral mucosal integrity is evaluated by visual examination and questioning the patient. The guideline evaluates changes to the oral mucosa in 8 areas. These 8 areas, namely changes in voice, swallowing function, saliva, tongue, lips, mucous membranes, gingiva, and teeth or prostheses, are scored on a scale of 1 to 3, with 1 being least severe and 3 being most severe. The final score, known as the Oral Mucosal Score (OMS), is calculated by aggregating the scores in all 8 areas, with the lowest score being 8 and the highest score being 24. As the score increases, intra-oral complaints and the severity of mucositis increases.

WHO Oral Mucositis Scoring Index. According to this index, the severity of oral mucositis is graded on a scale of 0 to 4 with 0 for no mucositis, 1 for mild mucositis, 2 for moderate mucositis, and grades 3-4 for severe mucositis.[19]

Patients were evaluated three times using the Oral Evaluation Guide and WHO Oral Mucositis Scoring Index during interviews held on the first, seventh and fifteenth days of the study by examining the mucous membranes of the patients with the help of a light source and asking patients how they felt. These assessments were made by a single researcher.

In-depth Interview Form with the Patients in the Intervention Group. The in-depth interview form developed by the researchers consisted of four questions designed to assess the effects of mucositis on the daily lives of the patients, patients' level of satisfaction with the effects of performing oral care with black mulberry syrup, the difficult aspects of performing oral care with black mulberry syrup, and patients' willingness to suggest oral care with black mulberry syrup to others. After the use of black mulberry syrup by the intervention group for a period of 15 days, an in-depth face-to-face interview was conducted using the questions in the form.

Production of the Black Mulberry Syrup Used in the Study. The black mulberry syrup used in this study was

produced by cold press infusion in steam and vacuum tanks. As a result, all active ingredients and vitamins were preserved. Furthermore, the syrup used is an all natural product containing no additives, which was obtained as directly packaged and sold at pharmacies. It is produced by a company.

Data Collection

According to the standard practice of the Chest Diseases Clinic where this study took place, patients with mucositis were treated with Nystatin and/or Benzidamine Hydrochloride as prescribed by the attending physician. The standard procedures of the clinic were applied to the control group. The patients in the intervention group however, were asked to gargle with black mulberry syrup three times a day for a period of 15 days. Gargles with black mulberry syrup were done postmeal for about 1 minute after which the syrup was swallowed. The intervention group gargled black mulberry syrup in addition to the standard practice of the clinic. The 15-day period of this study is consistent with the duration of mucositis healing as documented in other studies.[20-22] Follow-up and evaluation of patients who were discharged early were performed by home visits and daily phone calls. After the application of black mulberry syrup for 15 days, 10 individuals in the intervention group were interviewed using a semi-structured interview form.

Outcome Measures

In the study, the duration of oral mucositis healing and the severity of oral mucositis were examined. The Oral Evaluation Guide and WHO Oral Mucositis Scoring Index were used to assess the oral mucosae of the patients three times by means of interviews conducted on the first, seventh, and fifteenth days of the study.

Data Analysis

Quantitative data were evaluated using IBM SPSS Statistics 22.0 (IBM Corp., Armonk, New York, ABD). Descriptive statistics were given as number (n), percentage (%), mean ± standard deviation (X ± SD), median, 25th and 75th percentile. The normal distribution of the data was evaluated with Shapiro Wilk normality test and Q-Q graphs. Categorical variables were compared with the Chi-square exact test and intergroup comparisons of numeric variables were performed by the Independent Two-Sample *t* test and the Mann-Whitney *U* test. $P < .05$ was considered statistically significant. Comparisons of repeated measurements were performed using Friedman analysis for three measurements.

In analyzing the qualitative data, descriptive and content analysis methods were used. First, the researchers carried out the raw breakdown of all the interviews, reading interviews line by line. Then, the data were encoded within the framework of the questions in the in-depth interview form. The encoded data were further separated into categories according to their content and meanings. Three expert researchers subsequently analyzed the data independently and recorded results according to themes from which four overarching themes were created by establishing connections between the categories. All the qualitative data were then interpreted and put into a study report.

Ethical Considerations

Approval from the Ethics Committee and written permission from the institution were obtained. After the patients were informed about the purpose of the study, their written consents were also obtained.

RESULTS

Quantitative Findings

The mean age of the intervention and control groups were 68.6 ± 9.0 and 70.0 ± 10.9, respectively. In both groups, the majority of patients were male and had additional chronic diseases with hypertension being the most prevalent ($P > .05$) (Table 1).

Of the patients in the intervention group, 60.0% had experienced oral mucositis in the past and 50.0% of those who had previously experienced oral mucositis had done so 4 times or more, while 58.4% had only experienced moderate oral mucositis. Of the patients in the control group, 45.0% had experienced oral mucositis in the past and 55.6% of this group had experienced oral mucositis 4 times or more, while 66.7% had experienced moderate oral mucositis ($P > .05$) (Table 2).

Oral mucositis developed on the tongue in 40.0% of the patients in the intervention group and 44.4% of the patients in the control group. In the first interview, the OMS score of the intervention group was 15.0 ± 2.1, while the score for the control group was 15.2 ± 2.0 ($P > .05$). Oral mucositis of 95.0% of the patients in the intervention group healed during the follow-up period, while only 70.0% of patients in the control group saw similar improvements to oral mucositis in the follow-up period ($P < .05$). Oral mucositis healed at an average of 9.1 ± 2.5 days and 12.1 ± 1.4 days for the intervention and the control groups, respectively. There was also a statistically significant difference between the healing time of oral mucositis in both study groups ($P < .001$) (Table 3).

On the first day, both study groups had similar scores on the OMS and WHO Mucositis Scoring Index ($P > .05$). However, statistically significant differences were found between the OMS and WHO Mucositis Scoring Index scores of the study groups on the seventh and fifteenth days ($P < .05$). In the intervention group, the scores on the first, seventh and fifteenth days of the application were markedly different and there was a significant decrease in severity of oral mucositis in the two follow-up scores ($P < .001$). In the control group, the scores on OMS and WHO Mucositis Scoring Index were similar on the first and seventh days. However, on the fifteenth day, the scores were significantly lower than the previous two scores ($P < .001$).

Qualitative Findings

In the qualitative part of the study, data was examined according to four themes as follows:

Table 3. The Present Oral Mucosal Properties of the Intervention and Control Group

Variable	Categories	Intervention Group n(%)	Control Group n(%)	*P* Value
Localization of the Lesions[a]	Tongue	16 (40.0)	20 (44.4)	.146
	Cheek	11(27.5)	10 (22.2)	
	Inside in the lips	9 (22.5)	6 (13.3)	
	Soft palate	3 (7.5)	5 (11.1)	
	Gingiva	1 (2.5)	4 (8.8)	
OMS-1	(x ± SD)	15.0 ± 2.1	15.2 ± 2.0	0.826
Oral Mucositis Healing Status	Yes	19(95.0)	14(70.0)	**.037**
	No	1(5.0)	6(30.0)	
Oral Mucositis Healing Day	(x ± SD)	9.1 ± 2.5	12.1 ± 1.4	**<.001**[b]

[a]Given more than one answer, percentages were shown via n
[b]Independent two-sample *t* test

Table 4. Distribution of OMS Scores in Intervention and Control Groups According to Intergroup and Intra-Group Follow-up Times

	Groups	1st Day Median (25%-75%)	7th Day Median (25%-75%)	15th Day Median (25%-75%)	*P* Value
OMS	**Intervention Group**	15.5 (13.0-16.7)[a]	11.5 (9.2-14.0)[b]	9.0 (8.0-10.0)[c]	**<.001**[e]
	Control Group	15.0 (13.2-16.7)[a]	15.0 (13.0-17.0)[a]	11.0 (10.0-14.0)[b]	**<.001**[e]
	***P* Value**	.869[d]	**.001**[d]	**<.001**[d]	
WHO MSI	**Intervention Group**	2.0 (2.0-2.0)[a]	1.0 (0.0-1.7)[b]	0.0 (0.0-0.0)[c]	**<.001**[e]
	Control Group	2.0 (1.2-2.0)[a]	2.0 (1.2-2.0)[a]	0.0 (0.0-1.0)[b]	**<.001**[e]
	***P* Value**	.835[d]	**.001**[d]	**.037**[d]	

[a,b,c]The same letters signified no difference and different letters signified the presence of both between-groups and within-group differences.
[d]Mann Whitney U test
[e]Friedman analysis

Abbreviations: WHO MSI, WHO Mucositis Scoring Index.

Theme 1: Problems Related to Oral Mucositis. Patients stated that they experienced many problems such as burning sensation, pain, boredom, difficulty in consuming food, mouth/throat dryness, halitosis, deterioration in taste and difficulty in talking due to oral mucositis. Based on these statements, the problems most commonly experienced by patients were examined according to 6 sub-themes, namely pain, difficulty eating, deterioration in taste, difficulty talking, dysphagia/difficulty swallowing and isolation/fear of isolation.

"Pain"

The majority of patients said they experience pain while trying to eat or drink, with many saying that even drinking water caused intense pain.

"Even water makes me feel uncomfortable… It hurts even when I open and close my mouth." (participant 5, female, age 77)

"I hate these wounds, it is terrible… I want to carve my mouth from the pain." (participant 9, female, age 75)

"Difficulty eating"

The majority of the patients stated they had difficulty eating and especially that they could not consume spicy, bitter and sour foods because they caused intense pain, burning sensation and tingling. One person stated his oral wounds would often bleed after contact with food.

"…I can't eat or drink anything. I can't eat bread because the bread sinks into my wounds. Spicy and sour foods burn my wounds, even water hurts…" (participant 5, female, age 77)

"...I had a meal without knowing, and then my wounds bled…" (participant 3, male, age 52)

"Deterioration in taste"

Some patients stated that they experienced change in taste perception as a result from the wounds and wellings in their mouth.

"…my mouth was like a felt, I couldn't taste anything I ate" (participant 4, male, age 58)

"There were days when I couldn't eat, I didn't get a taste from eating and drinking…"(participant 8, female, age 66)

"Difficulty talking"

Some patients said that they had difficulty in talking when they had severe oral mucositis.

"The wounds in my mouth usually develop when I'm in the hospital. I think because they're giving me a lot of medicine here, these wounds develop. Sometimes I have difficulty talking…" (participant 2, female, age 70)

"…I just can't talk when I have much wounds" (participant 5, female, age 77)

***"Dysphagia* /** Difficulty swallowing**"**

Some patients said the wounds in their mouths caused difficulty in swallowing. Individuals stated that this condition resulted mainly from dryness of the mouth and intense pain.

"…My throat was too dry, I could not even drink water. It was very difficult to swallow anything. "(participant 5, female, age 77)

"…the wounds in my mouth cause me discomfort and pain when swallowing." (participant 6, female, age 72)

"Isolation / Fear of isolation"

Two patients stated they had oral mucositis-related halitosis which had negatively affected their social lives and caused problems in their interpersonal relations. One participant said his oral wounds had affected his relationship with his wife who keeps her distance from him because she thinks the wounds are contagious. That participant was particularly alarmed by the situation.

"…I'm worried that my mouth stinks. I've got a lot of children and no one will approach me if my mouth stinks." (participant 2, male, age 70)

"My wife stays away from me when I have a wound in my mouth. She is afraid that my wounds will infect her." (participant 3, male, age 52)

Theme 2: Effect of Black Mulberry Syrup on Oral Mucositis. Patients who had experienced oral mucositis in the past said that while using black mulberry syrup, their wounds did not deteriorate as before, they experienced less pain, had less trouble eating, and their wounds healed faster compared with their previous experiences.

"I think this experience is easy when I compare it with my previous ones. Before, I would be unable to eat because of the wounds. Thank God I didn't have any trouble this time." (participant 3, male, age 52).

"…it healed more quickly, immediately stopped my wounds progress. Now I drink my tea easily and I also eat." (participant 7, female, age 58)

Two patients said dryness of the mouth decreased and they were very satisfied with the results.

"My favourite feature is that the dryness of my mouth decreased when using it, so I was very pleased with it." (participant 9, female, age 75)

"The dryness of my mouth is gone and my pain is reduced." (participant 4, male, age 58)

Theme 3: Difficult Aspects of Oral Care With Black Mulberry Syrup. When the patients were asked about the difficult aspects of the application, four of them stated they had experienced no difficulties in gargling with black mulberry syrup.

"I like natural things and I did not find this application difficult." (participant 3, male, age 52)

"I never had a hard time using it. There's nothing to it— gargle three times a day, then swallow it." (participant 4, male, age 58)

One patient stated she did not like the taste of black mulberry syrup and that the application had been difficult for her the first time though she got used to it afterwards. Another patient stated that the syrup had a thick consistency and therefore she had some difficulty gargling with it at the beginning of the application though she later found it easier to use. Yet another patient stated that the sour taste of the black mulberry syrup increased salivation and decreased dryness of his mouth.

"Actually I don't really like it, but then I got used to it. I found it hard to swallow it at first, but I like it now." (participant 5, female, age 77)

"I had difficulty in gargling at first. It is a bit thick like molasses, but I got used to it later." (participant 8, female, age 66)

"It tastes a little sour…But when I took the syrup to my mouth, I noticed that my saliva increased. Dryness of my mouth also decreased." (participant 4, male, age 58)

Theme 4: Black Mulberry Syrup Suggestion for Oral Mucositis. When patients were asked whether they would recommend black mulberry syrup to others, all of the patients said that they were very happy with the results and that they would recommend the practice to others who had oral mucositis.

> *"Yes, I would recommend it. If the wound in my mouth returns in the future, I'll use it again." (participant 2, male, age 70)*

> *"I will suggest it to others… I benefited and everyone will benefit from it" (participant 6, female, age 72)*

DISCUSSION

During the study, regular and continuous improvement was observed in the severity of mucositis of the intervention group from day one. In addition, oral care with black mulberry syrup in patients with COPD was found to improve the healing time of oral mucositis. The fact that the intervention group experienced shorter healing time than the control group confirms the hypothesis that oral care with black mulberry syrup is effective in treating oral mucositis in patients with COPD.

There have been two studies evaluating the effectiveness of black mulberry molasses on oral mucositis caused by cancer and cancer treatments.[10,11] Demir Doğan et al[10] reported that black mulberry molasses prevented oral mucositis at a rate of 38%, delayed mucositis formation, and reduced the severity of mucositis in patients receiving head and neck radiotherapy. Ünal and Çınar[11] found that black mulberry syrup prevented oral mucositis and reduced dry mouth and sore throat in patients receiving chemotherapy. The findings of this research, which show that black mulberry syrup reduced the severity of oral mucositis and shortened healing time, are consistent with results from similar studies. Black mulberry has antifungal, antimicrobial[12] and antioxidant activity,[13] and these qualities account for its positive affects on the healing process.[23]

Mucositis causes many complications in the lives of patients,[24,25] and when participants were asked to explain how oral mucositis had affected their daily lives in the qualitative part of this study, many stated they had experienced intense problems ranging from physical pain to difficulty eating, and social isolation. Other studies which examine the effects of oral mucositis are consisent with the findings of this research.[26,27]

Oral mucositis causes severe pain with sensitivity in the mouth and throat, and the oral functions of the patients are significantly affected by this pain.[7,26-28] Cheng et al[26] state that as the severity of oral mucositis increased in patients receiving chemotherapy or radiation therapy, the severity of pain increased. These findings were confirmed in this study as the majority of the patients interviewed stated that they experienced intense pain due to oral mucositis.

In addition to pain in the mouth and throat, severe mucositis causes difficulty in chewing, swallowing and talking.[26,27] In this study, it was determined that individuals experienced problems such as change in taste and difficulty in swallowing and talking due to mucositis. These symptoms can negatively affect the quality of life, social relationships and the nutrient intake of affected patients.

Oral mucositis can significantly affect the nutrient intake of patients due to the discouraging effect of painful mouth sores and difficult swallowing on eating.[29] In a study involving pediatric oncology patients with mucositis and nausea, children described wounds in their mouths as "annoying", "painful", "making it hard to move my tongue" and "hard and painful to eat".[30] In this study, patients also had difficulty eating due to oral mucositis. All of the patients in the in-depth interview stated that they could not eat properly because of the wounds and dryness in their mouths. It is well known that inadequate nutrient intake can lead to longer healing times for wounds and also cause new wounds due to lack of the macro and micronutrients required by the body daily.

Depending on the severity of oral mucositis, individuals may also experience psychological problems such as restlessness, irritability and introversion. This may lead to social isolation.[31] In the qualitative part of this study, bad breath and fear of transmission of mucositis were found to be among the factors that caused difficulties in patients' social relationships.

In their study, Demir Doğan et al[10] found that oral care with black mulberry molasses prevented gingival sensitivity and the formation of esophagitis and dysphagia, and also delayed and decreased the severity of pain and dysphagia. Similarly, Ünal Çubukçu and Çınar reported black mulberry syrup reduced sore throat.[11] When patients in the intervention group who had performed oral care with black mulberry syrup were asked to compare their previous experiences of oral mucositis to their experience while enrolled in this study, they said that they experienced less pain and less complications. The data collected in this study is consistent with the findings of other studies and suggests strongly that oral care with black mulberry syrup can alleviate mucositis-related symptoms and improve mucositis healing.

Limitations of the Study

As a result of the short duration of hospitalizations, patients applied oral care with black mulberry syrup by themselves in their homes. While the researchers monitored the application by phone and house visits, they had to trust that patients had used the black mulberry syrup in oral care as directed and this dependence on the verbal confirmations of the patients was the main limitation of this study.

CONCLUSION

Oral care with black mulberry syrup accelerated the healing of oral mucositis and alleviated mucositis-related symptoms. On the strength of these results, oral care using black mulberry syrup is recommended in addition to standard pharmacological treatments for patients with oral mucositis. In addition, further comprehensive studies evaluating the

effect of black mulberry syrup on pain, dry mouth, swallowing and nutritional intake in patients with oral mucositis are recommended. Future studies should also evaluate the effectiveness of oral care using black mulberry syrup without standard pharmacological treatments such as Nystatin and/or Benzidamine Hydrochloride therapy. In addition, it is recommended that single-blind or double-blind randomized controlled trials be performed to compare black mulberry syrup to other non-pharmacological methods.

ETHICAL STATEMENT

The data of the study were collected by obtaining written permission from Erciyes University Clinical Trials Ethics Committee (Date: 20.01.2017, Decision No: 2017/42)

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AUTHORS' DISCLOSURE STATEMENT

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TRIAL REGISTRY INFORMATION

This study is registered with Clinical Trial Registration Number NCT04118335.

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