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Research Article

The Effects of Taste Changes on the Quality of Life of Patients Receiving Chemotherapy Treatment

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Abstract

Aim: The aim of this study is to determine the effect of taste changes on quality of life in cancer patients taking chemotherapy

Material and Methods: This descriptive study was conducted between January 2020 and September 2020 with cancer patients receiving chemotherapy in the inpatient and outpatient unit of a university hospital. The sample consisted of 466 cancer patients who met the inclusion criteria and received the same treatment at the same university hospital. Data were collected using the Introductory Information Form, the European Organization for Cancer Research and Treatment Quality of Life Scale Version 3 (EORTC QLQ-C30 Version 3.0), and the Chemotherapy-Induced Taste Change Scale (CiTAS).

Results: While the mean total score of EORTC QLQ-C30 was 62.97±13.31, the mean total score of CiTAS was found to be 40.43±17.84. Statistically significant correlations were found between total scores of EORTC QLQ-C30 and CiTAS scales and sub-dimension scores ($p<0.001$). In the regression analysis, it was found that the EORTC QLQ-C30 total score average of the individuals had a statistically significant and negative effect on the CiTAS total score average.

Conclusion: As a consequence, it was determined that taste changes in cancer patients receiving chemotherapy treatment negatively affect the quality of life.

Keywords: Cancer, chemotherapy, taste changes, quality of life

INTRODUCTION

Cancer is a set of diseases that emerge as a result of the mutation or abnormal activation of genes that control the growth and proliferation of cells and affect the person in terms of many psychological, physiological, economic, and social aspects (1). In Turkey and the rest of the world, cancer is in second place following cardiovascular diseases (2,3). According to the 2020 data of the World Health Organization (WHO), 19.3 million new cancer cases were diagnosed, and the yearly number of cancer diagnoses is anticipated to reach 30.2 million in 2040 (2).

Chemotherapy, which is applied to kill cancer cells or control their growth, has a significant place in cancer treatment (4). In individuals who are receiving chemotherapy treatment, in addition to symptoms such as pain, fatigue, insomnia, neutropenia, thrombocytopenia, bleeding, hiccups, dyspnea, mucositis, nausea, vomiting, anorexia, cachexia, diarrhea, constipation, itching, alopecia and skin and nail changes, changes in the sensation of taste may also be seen highly frequently (5,6). The prevalence of taste changes varies based on the type of antineoplastic agent, the localization of the tumor, and its type (7,8). According to recent studies, the prevalence of taste alterations in patients who are receiving chemotherapy treatment varies in the range of 20-86% (9-11).

Changes in taste affect the individual negatively in the psychological (stress, depression, reduced treatment adjustment, dysfunctional coping mechanisms, dislike/disgust for some foods), physiological (loss of appetite, weight loss, malnutrition, dry mouth, olfactory dysfunction, weakened immune system), and social (prolonged hospitalization) sense (7,10,12,13). Taste changes, which affect the life of the patient in many ways, also influence their quality of life negatively (7,9,13). It is important for cancer patients who are receiving chemotherapy treatment

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to live a quality life. Nurses assume important roles in the management of taste changes in cancer patients and the impacts of these changes on their quality of life (14). In this sense, a nurse should evaluate the taste change, its type, and its severity in their patients. They should support the patient in coping with the adverse effects of the treatment, plan interventions relevant to taste changes and implement these interventions (15). In the review of the literature on taste changes in chemotherapy patients, it was seen that there are very few studies conducted in Turkey on this topic. Hence, this study was carried out with a large sample to search the effects of taste changes on the quality of life of patients taking chemotherapy treatment.

MATERIAL AND METHOD

Research Type

This is a descriptive study.

Settings, Time, and Location

This study was carried out between January 2020 and September 2020 with patients who were receiving cytotoxic treatment at the medical oncology inpatient clinic and the outpatient chemotherapy unit of the Inonu University Turgut Ozal Medical Center Research and Training Hospital.

Population and Sample

The population of the study consisted of oncology patients who were taking chemotherapy treatment as inpatients and outpatients at the Inonu University Turgut Ozal Medical Center Research and Training Hospital. The sample consisted of those who were taking chemotherapy at the medical oncology inpatient clinic and the outpatient chemotherapy unit between the dates given above and met the inclusion criteria of the study. The minimum required sample size was calculated as 452 oncology patients in a 95% confidence interval, with a 0.05 error margin, and 0.95 power to represent the population (n=452). The sample included 466 patients.

Inclusion Criteria

The study included patients who were conscious, able to communicate verbally, over the age of 18, literate, volunteering to participate, taken at least one course of chemotherapy and experienced chemotherapy-induced taste changes.

Exclusion Criteria

The study excluded patients who were receiving radiotherapy in addition to chemotherapy and those who did not meet the inclusion criteria.

Data Collection

The data were collected using an Introductory Information Form that was developed by the researcher, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Version 3 (EORTC QLQ-C30 Version 3) and the Chemotherapy-Induced Taste Alteration Scale (CiTAS). Data collection took place in face-to-face interviews with the patients after they were individually informed about the study and provided consent. Each interview took approximately 20-25 minutes.

Data Collection Instruments

Introductory Information Form

The form, included nine questions on the patients' sociodemographic characteristics (age, sex, height, weight, BMI, education status, working status, income status, marital status, number of children, person/people living with them, problem/problems affecting the oral mucosa), habits (smoking and alcohol consumption status, daily oral care status and frequency), and disease-related characteristics (clinical diagnosis and stage, chronic diseases, treatment protocol, time since diagnosis, history of previous chemotherapy, duration of chemotherapy treatment, status of using other medication, problem/problems experienced other than taste changes).

Chemotherapy-Induced Taste Alteration Scale (CiTAS)

The scale, which aims to reveal the effects of taste changes that are observed in relation to chemotherapy on the person, was developed by Kano et al. in 2013 (10). It was made for validity and reliability in Turkish in 2014 by Sozeri and Kutluturkan (16). The 5-point Likert-type scale consists of 18 items and 4 subscales. The Decline in Basic Taste subscale assesses the status of sweet, salty, bitter, sour, and umami tastes to be sensed by the person; the Discomfort subscale assesses the relationship between changes in the sensation of taste and having difficulty in eating hot foods/fatty foods/meat, experiencing changes in the sensation of smell, loss of appetite, and nausea-vomiting; the Phantogeusia and Parageusia subscale assesses the status of the patient to experience phantogeusia and parageusia and the General Taste Alterations subscale assesses the status of the patient to experience cacogeusia, hypogeusia, and ageusia. The minimum and maximum scores of each subscale are 1 and 5 higher scores indicate the higher severity of the taste changes experienced by the patient and their increased discomfort associated with these changes (10). In the original Turkish article of the scale, its reliability coefficient was determined as 0.869, while this coefficient was calculated as 0.864 in this study (16).

European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Version 3 (EORTC QLQ-C30 Version 3.0)

The scale, which is used in cancer patients and has been performed to have validity, reliability, and applicability in large patient populations in 12 different countries, was made for validity and reliability in Turkish in 2008 by Cankurtaran et al. (17,18). It incorporates the categories

of Functional Scales, Global Health Status and Symptom Scales. The scale includes 30 items in total, and the first 28 items are 4-point Likert-type items. The last two items assess the patient's health status and general quality of life in the last week on a scale of 1 to 7. The minimum and maximum subscale scores in each of the three categories are 0 and 100. The first 28 items are related to the Functional Scales and Symptom Scales categories, and lower scores demonstrate higher quality of life levels, whereas higher scores demonstrate lower quality of life levels. The last two items are related to the Global Health Status category, and higher scores demonstrate higher quality of life levels, whereas lower scores demonstrate lower quality of life levels. Cankurtaran et al. reported the reliability coefficients of the scale in the range of 0.56 to 0.85, while the reliability coefficient of the scale was calculated as 0.910 in this study (18).

Data Analysis

The Statistical Package for the Social Sciences (SPSS) 25 program was used in the analyses of the data. The level of statistical significance was accepted as $p<0.05$. The analyses included percentage, frequency, mean and standard deviation values, Spearman's Correlation Analysis, and Linear Regression Analysis.

Ethical Approval

To conduct the study, ethical approval was got from the Inonu University Scientific Research and Publications Ethics Committee (2019/367), and written institutional permissions were obtained from the Chief Physician's office at the Inonu University Turgut Ozal Medical Center Research and Training Hospital and the Directorate of the Medical Oncology Department. Permissions to use the scales were obtained via e-mail from the authors who developed the scales. Consent was got from the patients who voluntarily agreed to participate in the study.

RESULTS

It was found that 57.9% of the patients were female, 51.5% were between the ages of 45 and 64, 87.3% were married, 41.6% were primary school graduates, and the incomes of 51.9% were equivalent to their expenses. The most frequently observed type of cancer was breast cancer (36.9%), the clinical stage of 40.3% of the patients was stage 2, their mean diagnosis duration was 18.60±29.13 months, and the mean duration of their current chemotherapy course was 2.82±2.01 months (Table 1).

While 72.3% of the patients reported a condition affecting the oral mucosa, the most frequently reported condition was dryness in the mouth at 57.6%. It was determined that 97.2% of the patients practiced oral hygiene daily, the mean number of their oral hygiene practices per day was 2.19±1.37, and the most frequently practiced oral hygiene method was brushing teeth at 51.4% (Table 2).

Table 1. Sociodemographic and disease-related characteristics of the patients (n=466)

Sociodemographic and Disease-Related Features		n	%
Gender	Male	196	42.1
	Female	270	57.9
Age	between the ages of 18 and 30	10	2.1
	between the ages of 31 and 44	77	16.5
	between the ages of 45 and 64	240	51.5
	65 years and older	139	29.8
Marital Status	Single	59	12.7
	Married	407	87.3
Education Status	Literate	92	19.7
	Primary School	194	41.6
	Middle School	60	12.9
	High School	82	17.6
	University	37	7.9
	Master's and Doctorate	1	0.2
Income Level	Income Less Than Expenses	207	44.4
	Income Equivalent to Expense	242	51.9
	Income More Than Expenses	17	3.6
Clinical Diagnosis	Lung Cancer	85	18.2
	Breast Cancer	172	36.9
	Hematological Cancers	21	4.5
	Genitourinary System Cancers	79	17.0
	Gastrointestinal System Cancers	86	18.5
	Other	23	4.9
Clinical Stage	Stage 1	65	13.9
	Stage 2	188	40.3
	Stage 3	162	34.8
	Stage 4	51	10.9
		Mean±Standard Deviation	
Diagnosis Duration (Months)		18.60±29.13	
Current Chemotherapy Cycle Duration (Months)		2.82±2.01	

Table 2. The characteristics of the oral mucosa and care of the patients (n=466)			
Oral Mucosa and its Care-Related Features		**n**	**%**
Is there a condition that affects the oral mucosa?	Yes	337	72.3
	No	129	27.7
What condition affects the oral mucosa? (You can mark more than one)	Dry Mouth	235	57.6
	Mouth Wound	167	40.9
	Intraoral Bleeding	6	1.5
Do you do daily oral care?	Yes	453	97.2
	No	13	2.8
How do you perform your oral care? (You can mark more than one)	Brushing Teeth	317	51.4
	Rinsing mouth with water	177	28.7
	Mouthwash	123	19.9
		Mean±Standard Deviation	
Daily Oral Care Frequency		2.19±1.37	

The mean total EORTC QLQ-C30 score of the patients was 62.97±13.31, while their mean total CiTAS score was 40.43±17.84. Among the categories of EORTC QLQ-C30, the mean scores of the patients were 8.31±2.95 in the Global Health Status category, 29.72±8.66 in the Functional Scales category, and 25.49±7.41 in the Symptom Scales category. Among the subscales of CiTAS, the mean scores of the patients were 2.04±1.30 in the Decline in Basic Taste subscale, 2.41±0.96 in the Discomfort subscale, 2.16±1.20 in the Phantogeusia and Parageusia subscale, and 2.32±1.23 in the General Taste Alterations subscale (Table 3).

Statistically significant relationships were found between EORTC QLQ-C30 and CiTAS and between the subscales of EORTC QLQ-C30 and the subscales of CiTAS ($p<0.001$). The total EORTC QLQ-C30 scores and the EORTC QLQ-C30 Global Health Status category scores of the patients were significantly and negatively related to their total CiTAS scores and their scores in all subscales of CiTAS, while the EORTC QLQ-C30 Functional Scales and Symptom Scales category scores of the patients were significantly and positively related to their total CiTAS scores and their scores in all subscales of CiTAS (Table 4).

The results of the regression analysis showed that the total EORTC QLQ-C30 scores of the patients had a negative and statistically significant affect their total CiTAS scores. Accordingly, a rise in the quality of life levels of the patients led to more favorable outcomes regarding their taste changes (Table 5).

Table 3. EORTC QLQ-C30 and CiTAS total score and sub-dimension score averages		
		Mean±Standard Deviation
EORTC QLQ-C30	**Scale Total Score**	62.97±13.31
	Global Health Status	8.31±2.95
	Symptom Scales	25.49±7.41
	Constipation	1.72±0.93
	Pain	3.98±1.82
	Diarrhea	1.35±0.75
	Nausea/Vomiting	3.85±1.37
	Fatigue	7.15±2.41
	Appetite Loss	2.13±1.08
	Sleep Disturbance	2.11±1.11
	Dyspnea	1.53±0.81
	Financial Impact	1.68±0.94
	Functional Scales	29.72±8.66
	Physical Functioning	11.44±3.69
	Emotional Functioning	7.67±3.38
	Role Functioning	3.61±1.59
	Social Functioning	3.75±1.81
	Cognitive Functioning	3.26±1.42
CITAS	Scale Total Score	40.43±17.84
	Discomfort	2.41±0.96
	General Taste Alterations	2.32±1.23
	Phantogeusia and Parageusia	2.16±1.20
	Decline in Basic Taste	2.04±1.30

EORTC QLQ-C30: European Organization for Research and Treatment of Cancer Quality of Life Scale, CiTAS: Chemotherapy-induced Taste Alteration Scale

Table 4. The relationship between EORTC QLQ-C30 and CiTAS total score and sub-dimension score means

			EORTC QLQ-C30				CITAS				
			Global Health Status	Functional Scales	Symptom Scales	Total	Decline in Basic Taste	Discomfort	Phantogeusia and Parageusia	General Taste Alterations	Total
EORTC QLQ-C30	Global Health Status	r	-	-0.580	-0.640	-0.508	-0.291	-0.413	-0.257	-0.366	-0.423
		p		**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***
	Functional Scales	r		-	0.808	0.945	0.452	0.502	0.381	0.488	0.549
		p			**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***
	Symptom Scales	r			-	0.921	0.474	0.585	0.397	0.523	0.616
		p				**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***
	Total	r				-	-0.496	-0.579	-0.418	-0.529	-0.616
		p					**<0.001***	**<0.001***	**<0.001***	**<0.001***	**<0.001***
	Decline in Basic Taste	r					-	0.524	0.497	0.771	0.829
		p						**<0.001***	**<0.001***	**<0.001***	**<0.001***
	Discomfort	r						-	0.476	0.564	0.814
		p							**<0.001***	**<0.001***	**<0.001***
	Phantogeusia and Parageusia	r							-	0.563	0.715
		p								**<0.001***	**<0.001***
	General Taste Alterations	r								-	0.868
		p									**<0.001***
CITAS	Total	r									-
		p									

EORTC QLQ-C30: European Organization for Research and Treatment of Cancer Quality of Life Scale, CiTAS: Chemotherapy-induced Taste Alteration Scale, r: Spearman Correlation coefficient, *p<0.05: There is a statistically significant relationship between the scores

Table 5. CiTAS total score estimation regression analysis

					%95 Confidence Interval	
	B	β	t	Sig.	Lower Limit	Upper Limit
Constant	7.487		0.636	0.525	-15.659	30.634
EORTC QLQ-C30 Total Score Average	-0.789	-0.588	-14.570	**<0.001***	-0.682	-0.895

B: Non-standardized Beta Coefficient, R(Correlation Coefficient)=0.637, R2(Explanatory Coefficient) = 0.406, Adjusted R2(Standardized Explanatory Coefficient)=0.382, β: Standardized Beta Coefficient, F= 16.980, p*<0.05: t test result for the significance of the regression coefficients

DISCUSSION

Although taste changes do not constitute a life-threatening symptom, they lead to a reduced quality of life in cancer patients who receive chemotherapy treatment because they affect these patients in many respects (7,9).

In our study, most of the patients had a condition that affected their oral mucosa, and the most frequently reported condition was dryness in the mouth. Most patients performed daily oral care practices, and the most common oral care method was brushing teeth. Sozeri (n=184) also reported the most common oral care method as brushing teeth (7). In the literature, taste changes have been observed more frequently in patients with dry mouth and mouth sores (16,19). In their study on chemotherapy patients (n=120), Berk et al. reported that 51.7% of the patients experienced mild taste changes due to their mouth sores (19). Chemotherapy-induced reductions in saliva secretion and changes created in the oral mucosa by chemotherapy can affect the sensation of taste (15,20-22). Patients with dryness in the mouth are at risk of taste dysfunctions because foods have to be dissolved for their contact with taste receptors. This is why nurses are recommended to provide education to patients regarding this issue, perform their oral care, and increase their fluid intake (15). It was reported that special education and training programs on oral care affected the clinical practices of nurses positively (23).

Considering the maximum possible scores of CiTAS and

its subscales, it may be stated that the patients who were included in our study experienced moderate levels of taste changes, and they had discomfort associated with these taste changes. A previous study that was conducted with lung cancer patients revealed that the patients experienced moderate levels of taste changes and moderate discomfort associated with these taste changes (24). In the study that was carried out by Celik et al. (n=196), it was found that patients experienced moderate levels of taste changes, as well as moderate levels of phantogeusia and parageusia among types of taste change (25). In other studies using CiTAS and examining taste changes in different types of cancer, CiTAS subscale scores have usually been reported in the range of 1-3 (7,26,27). In addition to the direct physiological effects of chemotherapy, other symptoms of the disease itself and the adverse effects of chemotherapy also affect the sensation of taste. Due to all these factors, patients experience taste changes (7,28). The finding in our study that the "Discomfort" subscale scores of the patients were higher can be explained by the possibility that these patients experienced discomforting symptoms such as nausea, vomiting, and loss of appetite.

In our study, the scores of the patients in the "Functional Scales" category of EORTC QLQ-C30 were higher than their scores in the other categories. High scores in the "Functional Scales" and "Symptom Scales" categories of EORTC QLQ-C30 indicate low quality of life levels (17). In line with this information that is used to assess the scores of the scale, the quality of life levels of the patients in our study were low. Other studies in the literature have shown that chemotherapy has negative effects on quality of life and lowers the quality of life of patients (29-31). In a study that was performed to compare the quality of life levels of cancer patients in two different chemotherapy cycles (n=50), the scores of the patients in both groups in the "Functional Scales" category of EORTC QLQ-C30 were found higher than their scores in the other categories (32).

In our study, statistically significant relationships were identified between EORTC QLQ-C30 and CiTAS and between the subscales of EORTC QLQ-C30 and the subscales of CiTAS. As the CiTAS scores of the patients increased, their scores in the "Global Health Status" category of EORTC QLQ-C30 decreased, and their scores in the "Functional Scales" and "Symptom Scales" categories of EORTC QLQ-C30 increased. In other words, as the taste changes scale scores of the patients increased, their quality of life decreased. The consequence of the regression analysis in this study supported the results of the correlation analysis. According to other studies in the literature, taste changes affect the quality of life of patients negatively (8, 9, 33). In another study that was carried out with cancer patients receiving cytotoxic treatment (n=197), it was reported that the patients showed symptoms of loss of appetite and fatigue due to taste changes, and these symptoms affected their quality of life negatively (9). In the study by Gamper et al. that was conducted with breast cancer patients and gynecologic cancer patients who were receiving chemotherapy (n=109), the authors showed a statistically significant relationship between the taste changes of the patients and their symptoms of fatigue and loss of appetite. They stated that these symptoms affected the quality of life of the patients negatively (8). In their study on patients undergoing chemotherapy treatment (n=214), Kano et al. found that taste changes affected the patients' activities of daily living negatively (10). In another study that included patients who were taking chemotherapy treatment (n=289), the quality of life levels of the patients who experienced taste changes were lower compared to those who did not experience taste changes (34). Spotten et al. (n=40), on the other hand, determined that taste and olfactory changes reported by patients with solid tumors did not significantly affect their quality of life (35). The results of our study were in parallel with those in the literature. Taste changes, which are a commonly overlooked symptom, disrupt the well-being and quality of life of patients and affect their daily lives and social and emotional statuses adversely (36,37).

Limitations

As the study was carried out during the ongoing COVID-19 pandemic period, during data collection at the hospital, some patients did not want to be included in the study to avoid the prolongation of their hospital stay and to prevent infection. The exclusion of these patients was among the limitations of this study.

CONCLUSION

In our study, statistically significant relationships were found between the total and subscale scores of the patients in the taste changes and quality of life scales. It was found that as the scores of the patients in the taste changes scale increased, their quality of life decreased. Based on the results of this study, nurses are recommended to provide the cancer patient and their family with education on their disease, treatment, complications, and symptoms, assess their symptoms of taste change and take these symptoms under control. It is also recommended to plan nursing interventions to increase the quality of life of patients experiencing taste changes associated with chemotherapy and organize educational programs.

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Ethical approval: *To conduct the study, ethical approval was got from the Inonu University Scientific Research and Publications Ethics Committee (2019/367).*

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