

**AWARENESS OF RADIATION ONCOLOGISTS
REGARDING ORAL EVALUATION OF PATIENTS
BEFORE RADIOTHERAPY: SURVEY STUDY**

Fatih Özcan¹, Bilge Özcan^{2✉}

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Abstract

Radiotherapy is one of the most preferred methods in head and neck cancers. Many oral complications develop in patients during and after radiation from the head and neck region. While these complications affect the comfort of life in patients, they also cause many problems in the treatment process for physicians. The aim of this study is to evaluate the knowledge, opinions and attitudes of physicians who perform radiotherapy about dentistry and multidisciplinary approach before or during radiotherapy. A total of 120 physicians who applied radiotherapy participated in the study. The questionnaire consists of 14 questions which were sent online to practitioners working in many centres. The results were entered into the statistics data package system. 78.6% of the physicians answered yes to the question of simultaneous dentistry and multidisciplinary approach during radiotherapy. While 82.1% answered yes as the level of knowledge in terms of complications, 79.5% answered yes to the question of supportive treatments, and 29.9% answered yes to the question of applying protective appliances. While the level of knowledge of the physicians participating in this study was sufficient in terms of complications, a lower rate was found in terms of dental consultation and dentistry, as well as multidisciplinary approach and protective appliances.

Key words: radiotherapy, oral side effect, dental consultation, multidisciplinary approach

Introduction. Head and neck cancer is defined by tumour location as a group of malignancies that principally affect the oral cavity, nasal cavity, sinuses, salivary glands, pharynx, and larynx [1]. Over 550 000 new cases of this cancer are diagnosed worldwide every year [2]. In 2018, according to GLOBOCAN data, 710 237 new cases of head and neck cancers were reported, 55 550 of which were located in the oral cavity [3]. Radiotherapy and surgery are the most common treatment modalities used for head and neck cancer [1]. Although radiotherapy is considered an effective local therapeutic modality, it can imply adverse effects in the irradiated region, such as xerostomia, oral mucositis, candidiasis, osteoradionecrosis, taste changes, trismus, radiation-related caries, changes in odontogenesis, disorders of bone growth, and dermatitis of the irradiated area [4-6].

Dental caries, or tooth decay, is a localised destructive disease of dental hard tissue that entails the demineralisation of enamel and dentine by cariogenic plaque bacteria. Behind an advancing front of acid-induced demineralisation, bacterial ingress and infection trigger a series of inflammatory and immunological pulpal reactions within the tooth [7]. Rampant and aggressive caries are observed in as little as three months after radiotherapy. Decay in demineralized enamel and dentin may irritate the pulp and necessitate root canal treatment. After radiotherapy, these carious lesions may progress and may require root canal treatment. Failure of root canal treatment requires tooth extraction; it may cause osteoradionecrosis, which is another important side effect. One of the most common complications is soft tissue diseases and mucositis associated with a decrease in the amount of saliva. Pain due to mucositis may cause decreased oral water and food intake, which may lead to malnutrition in patients. This complication sometimes leads to discontinuation of the patient's radiotherapy treatment, which may affect the patient's survival. In order to prevent serious oral complications, dentistry-based oral treatment should become a common approach for patients receiving radiotherapy for head and neck cancer before, during and after treatment. However, instead of dealing with conventional radiotherapy-related complications for patients with head and neck cancer, it is necessary to turn to dentistry-based multidisciplinary approaches.

The aim of this study is to determine the guidance knowledge level of pre-procedure dental consultation in the treatments applied by radiation oncologists and to reveal the level of continuation of dental care simultaneously during the treatments applied by oncologists. The aim is to determine whether the need for prophylaxis before the procedure and the complications encountered vary depending on professional experience, and to determine the treatment approaches in patients experiencing toothache.

Materials and methods. This study was started with the approval of the Board Decision of the Ethics Committee of Ankara Medipol University Faculty of Dentistry (Ethics Committee Board Decision Number: E-81477236-604.01.01-1110). This study was conducted in accordance with the latest guidelines of the

principles of the Declaration of Helsinki.

An online questionnaire was sent to 120 people consisting of research assistants, specialist doctors and faculty members working in different universities, and the accepted physicians started the survey by selecting the option that is a consent form. Questionnaires to be filled in by volunteer research assistants, specialist doctors and faculty members with an age range of 25–50 who are competent to apply head and neck radiotherapy were included in the study. Physicians who did not volunteer to participate in the survey, physicians who participated in the survey but completed their tenure, retired or resigned were not included in the study. The survey results of three physicians who retired and resigned were excluded from the study. The study was conducted on the results of the questionnaire of 117 physicians. Survey questions consist of two separate parts. The first part consists of three questions including title, gender and years of professional experience, while the second part includes a total of 14 questions, including 11 questions about oral and dental health before and during radiation therapy.

Statistical analysis. All data were analyzed using SPSS 25.0 package program. Variables were summarized as frequency “*n*” and percentage as “%”. Categorical data were compared with the Chi-Square test. In multi-cell tables, Fisher’s exact test was used in cases where the expected value was less than 5 in more than 20% cells. The significance level was $p < 0.05$ for all analysis results.

Result. In Table 1, the percentage distributions of the questions asked in the first part of the questionnaire are given. The first three questions revealed the demographic data of the physicians. While 67.5% of the physicians participating in the survey are research assistants, 20.5% are specialist doctors and 12% are associate professors. Although there was no significant difference in terms of gender distribution, 41% were female and 59% were male physicians. In terms of the distribution of occupational experience period, the highest rate was 1–3 professional years with a rate of 44.4%, while the lowest was 6–10 years with a rate of 3.4%.

T a b l e 1

Demographic data that make up the first part of the survey

		<i>n</i>	%
1-TITLE	Research assistant	79	67.5
	Specialist doctor	24	20.5
	Professor	14	12.0
2-GENDER	Female	48	41.0
	Male	69	59.0
3-YOUR EXPERIENCE IN THE PROFESSION (the beginning of the assistantship will be taken as a basis)	1–3 years	52	44.4
	3–6 years	36	30.8
	6–10 years	4	3.4
	10–20 years	25	21.4

T a b l e 2

Percentage of questions and responses that make up the second part of the survey

Questions		n	%
4-Can you evaluate the teeth and soft tissues before head and neck radiotherapy?	Yes	107	91.5
	No	10	8.5
5-If your answer to the previous question is yes, answer it. What is your favourite method for dental and soft tissue evaluations of patients?	A) Questioning the pain condition and directing it to the dentist before radiotherapy	48	44.9
	B) Referral to dentistry faculties or oral and dental health centres with written consultation	48	44.9
	C) To evaluate the dental and oral examination with their own observation	10	9.3
	D) In any case referral to the dentist before RT	1	0.9
6-Do you have enough information about the possible side effects that are frequently encountered in patients receiving head and neck radiotherapy and their treatments?	Yes	96	82.1
	No	21	17.9
7-What are the complications you often encounter in the oral area during head and neck radiotherapy?	Mucositis and stomatitis	110	94.0
	Dry mouth	85	72.6
	Dental caries and related toothache	40	34.2
	Soft tissue canker sores	64	54.7
	Burning mouth	38	32.5
	Trismus	13	11.1
	Osteoradionecrosis	8	6.8
8-Do you think it is necessary to continue dental check-ups and treatments simultaneously with head and neck radiotherapy?	Yes	92	78.6
	No	25	21.4
9-Are there any situations where you interrupt treatment due to toothache during head and neck radiotherapy?	Yes	25	21.4
	No	92	78.6
10-What kind of path do you follow in patients who develop acute toothache during head and neck radiotherapy?	A) I prescribe analgesics to the patient, continue radiotherapy, and then refer him to the dentist	60	51.3
	B) I decide according to the need for radiotherapy	36	30.8
	C) In any case I take a break from radiotherapy and refer the patient to the dentist	19	16.2
	D) I did not encounter it	1	0.9
	E) I try not to take a break from RT as much as possible	1	0.9
11-Do you recommend antibiotic prophylaxis before the procedure in case of root canal treatment (bleeding procedure with risk of bacteremia and sepsis in which the dental pulp is removed under local anesthesia) for acute toothache that develops during head and neck radiotherapy?	Yes	106	90.6
	No	11	9.4
12-Do you apply supportive treatments to protect the hard and soft tissues in the oral area and to ensure the continuity of salivary secretions of patients during head and neck radiotherapy?	Yes	93	79.5
	No	24	20.5
13-How do you decide in a situation where a consultation is requested by a dentist for a tooth that has been indicated for extraction as a result of acute toothache during head and neck radiotherapy?	A) Postponing tooth extraction and suppressing the pain with a temporary method to be decided by the dentist	85	73.3
	B) Temporary suppression of pain with analgesics and painkillers without dental intervention	29	25.0
	C) Extraction of the tooth	2	1.7
14-Do you refer your patients to the dentist to better protect the oral tissues from radiation and its undesirable effects by applying an intraoral protective appliance before head and neck radiotherapy?	Yes	35	29.9
	No	82	70.1

T a b l e 3

*Chi-Square and **Fisher's statistical results of exact tests

		Research assistant <i>n</i> (%)	Specialist doctor <i>n</i> (%)	Professor <i>n</i> (%)	χ^2	<i>p</i>
4 Oral evaluation	Yes	69(87.3)	26(100.0)	12(100.0)	4.323	0.071**
	No	10(12.7)	0(0.0)	0(0.0)		
5 Evaluation method	A	28(40.6)	16(61.5)	4(33.3)	9.489	0.113**
	B	30(43.5)	10(38.5)	8(66.7)		
	C	10(14.5)	0(0.0)	0(0.0)		
	D	1(1.4)	0(0.0)	0(0.0)		
6 RT possible side effect information	Yes	61(77.2)	23(88.5)	12(100.0)	4.196	0.110**
	No	18(22.8)	3(11.5)	0(0.0)		
8 Simultaneous with dentistry	Yes	64(81.0)	18(69.2)	10(83.3)	1.792	0.408*
	No	15(19.0)	8(30.8)	2(16.7)		
9 Interruption of treatment	Yes	14(17.7)	7(26.9)	4 _a (33.3)	2.125	0.346*
	No	65(82.3)	19(73.1)	8 _a (66.7)		
10 The path followed in acute pain	A	35 _a (44.3)	17 _a (65.4)	8 _a (66.7)	15.793	0.024**
	B	32 _a (40.5)	2 _b (7.7)	2 _{a,b} (16.7)		
	C	10 _a (12.7)	7 _a (26.9)	2 _a (16.7)		
	D	1 _a (1.3)	0 _a (0.0)	0 _a (0.0)		
	E	1 _a (1.3)	0 _a (0.0)	0 _a (0.0)		
11 Supportive therapy	Yes	75 _a (94.9)	19 _b (73.1)	12 _{a,b} (100.0)	9.455	0.005**
	No	4 _a (5.1)	7 _b (26.9)	0 _{a,b} (0.0)		
12 The path followed in the need for tooth extraction	Yes	59(74.7)	24(92.3)	10(83.3)	3.848	0.146*
	No	20(25.3)	2(7.7)	2(16.7)		
13 Consultation decision	A	58(74.4)	19(73.1)	8(66.7)	1.508	0.854**
	B	18(23.1)	7(26.9)	4(33.3)		
	C	2(2.6)	0(0.0)	0(0.0)		
14 Protective appliance	Yes	32 _a (40.5)	1 _b (3.8)	2 _{a,b} (16.7)	13.659	< 0.001*
	No	47 _a (59.5)	25 _b (96.2)	10 _{a,b} (83.3)		

T a b l e 4

7th in the survey. Chi-square test result of the question

	Research assistant <i>n</i> (%)	Specialist doctor <i>n</i> (%)	Professor <i>n</i> (%)	χ^2	<i>p</i> *
Mucositis and stomatitis	72(91.1)	26(100.0)	12(100.0)	33.234	0.003
Dry mouth	56(70.9)	19(73.1)	10(83.3)		
Dental caries and related toothache	24(30.4)	6(23.1)	10(83.3)		
Soft tissue canker sores	45(57.0)	13(50.0)	6(50.0)		
Burning mouth	28(35.4)	4(15.4)	6(50.0)		
Trismus	11(13.9)	0(0.0)	2(16.7)		
Osteoradionecrosis	6(7.6)	0(0.0)	2(16.7)		

In Table 2, 91.5% of the physicians participating in the survey perform dental and soft tissue evaluation before the procedure. While 82.1% of the physicians answered yes in the evaluation of possible side effect information during radiotherapy treatment; 17.9% answered no.

While 78.6% of the physicians said yes to the question if it is necessary to continue dental controls and treatments simultaneously with head and neck radiotherapy, 78.6% of the physicians answered no to the question of interrupting radiotherapy treatment due to dental pain during treatment.

In patients who developed acute toothache during head and neck radiotherapy, 51.3% of the physicians answered "I prescribe analgesics to the patient and continue radiotherapy and then refer them to the dentist". While 90.6% of the physicians answered yes to the antibiotic prophylaxis consultation by the dentist before endodontic treatment in acute toothache during radiotherapy, 9.4% did not see the need for antibiotic prophylaxis. While 79.5% of the physicians answered yes to the question of the need for supportive treatment to ensure the continuity of salivary secretions, 20.5% answered no.

In the consultation requested from oncologists in patients who decided to have tooth extraction during radiotherapy, 73.3% of the physicians postponed the decision of tooth extraction, while 1.7% answered that tooth extraction could be performed. While 70.1% of the physicians answered no to the question of evaluating the oral tissues to the faculty of dentistry in terms of applying protective appliances before radiotherapy treatment, 29.9% answered yes.

In Table 3, it was seen that the oral evaluation, evaluation method, RT possible side effect information, interruption of RT due to pain, route followed in acute pain, supportive treatment and protective appliance status did not differ between the groups according to the titles of the participants. It was found that the pre-procedural prophylaxis situation differed between the groups and the research assistants had a higher B option than the specialist doctors ($p = 0.024$). It was observed that the supportive treatment status differed between the groups and the research assistants preferred the yes option at a higher rate than the specialist doctors ($p = 0.005$). It was observed that the possible side effects encountered differed between the groups and the research assistants preferred the yes option at a higher rate than the specialist doctors ($p < 0.001$).

In Table 4, it was seen that there was a significant difference between the groups when the complications frequently encountered in the oral region during head and neck radiotherapy were compared according to the titles of the participants ($\chi^2 = 33.234(14)$; $p = 0.003$). Research assistants encountered more of the mentioned complications.

Discussion. Radiotherapy stimulates cellular destruction by deoxyribonucleic acid (DNA) damage. Increasing the radiation dose to the tumour increases the probability of cure, however, higher radiation doses are constrained by the potential to cause damage to normal tissue [8, 9]. Potential side effects of head

and neck radiotherapy have been well documented and include: mucositis [10], trismus [11], salivary gland hypofunction [12], dental caries [13], periodontal disease [14], and osteoradionecrosis [15].

Pre-radiation and post-radiation dental treatment in patients with head and neck cancer is often a clinical challenge [16]. Oral alterations can be prevented or at least more properly managed if dental and medical health care providers work together. Dental evaluation and treatment with a long-term oral care regimen is recognized as an important aspect to be considered before, during and after radiotherapy [17, 18].

For the success of treatments, oral and dental health awareness should be considered one of the main goals that should be created in patients. Increasing the quality of life of patients diagnosed with head and neck cancer with comfortable living, minimum pain and side effects during and after radiotherapy should also be among the main goals of radiation oncologists who apply radiotherapy. This study aimed to reveal the knowledge levels of radiation oncologists about preventive dentistry before radiotherapy.

Many studies have been conducted on head and neck cancers, but no studies have been found on the level of knowledge of oncologists related to dental treatment and needs. In this study, oncologists' knowledge, opinions and attitudes were evaluated.

Previous studies have shown that more than 90% of head and neck cancer patients receiving radiotherapy complain of mucositis as a side effect of radiotherapy [19]. In this study, as a result of the answers given by the physicians who participated in the survey, mucositis was the most common side effect in 94%. Among the physicians surveyed, the response to dental evaluation before RT was 91.5%, while this rate decreased to 78.6% during RT treatment. In patients who received radiotherapy in the head and neck region, the answer was no in 78.6% of the proportions, and the answer of 51.3% was to complete the process by giving analgesics without interrupting RT for an acute pain that developed during RT. This condition is thought to be due to the malignancy of head and neck cancers and is related to the fact that the doctors who perform RT do not interrupt the treatment process. Antibiotic prophylaxis before endodontic treatment was accepted as yes in 90.6% of the patients who were indicated for root canal treatment during RT. The answer to the question of supportive treatment to increase saliva secretion during RT was 79.5% yes.

The question of intraoral protective appliance before RT was answered as yes by 29.9%. This rate was found to be quite low. In a study conducted by COLLOC et al. [20], they stated that there was an improvement in mouth opening at a rate of 77.7% in patients who used appliances compared to the control group, thanks to the appliance they applied to the patients.

In the intra-group evaluations, there was no statistically significant difference in the questions of conducting RT simultaneously with dentistry ($p > 0.408$), in-

interruption of treatment due to toothache ($p > 0.346$) and the path followed if tooth extraction is required during RT ($p > 0.146$). In previous studies, lead or tungsten-like protectors were applied between the area where intraoral radiotherapy will be applied and the healthy area, but these oral appliances were not preferred because they cause backscattering electrons. However, due to the advantages of resin-containing materials such as eliminating the backscatter electron, making this appliance lighter and increasing the fixation of the radiation field, it has started to take place in today's current studies [20]. In this study, a statistically significant difference was found in the question of applying protective appliances in order to prevent possible side effects during RT compared to associate professors with academic titles ($p < 0.001$). It is thought that this situation is due to the fact that there were not many studies containing resin during the periods when the professors were research assistants and different dental materials were used.

Conclusion. In this study, the level of knowledge of radiation oncologists about dentistry and multidisciplinary treatment approaches before and during radiotherapy in patients was revealed by a questionnaire. According to the results of the survey, the number of research assistants is considerably higher than the number of specialist doctors and doctors with academic titles. In particular, by adding dentistry education rotation to the residency training process, it can make significant differences in reducing and preventing the effects of complications during the radiation therapy process and the awareness of dental treatment, especially before and during radiotherapy. Especially in recent years, cases in which the oral health and quality of life of the patient are maintained with protective appliances in patients with head and neck cancer have started to take their place in the literature. Such studies increase the importance of multidisciplinary approach together with dentistry in the treatment of radiation oncologists, especially in head and neck cancers.

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¹*Department of Radiation Oncology, Ankara Etlik City Hospital, 5 Halil Sezai Erkut Blvd, 06170 Yenimahalle/Ankara, Türkiye*
e-mail: fatihozcan_dr@hotmail.com

²*Department of Endodontics, Ankara Medipol University, 88/1 Celal Bayar Blvd, 06050 Cankaya/Ankara, Türkiye*
e-mail: bilge.ozcan@ankaramedipol.edu.tr