

## The effect of COVID-19 disease on patients diagnosed with skin cancer in the dermatology clinic

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### Abstract

**Objective:** We aimed to define the impact of the pandemic on patients presenting to dermatology clinic with skin cancer.

**Methods:** In our study, the characteristics of patients who attended our dermatology clinic before six months and after six months of March 11, 2020, and whose biopsies diagnosed as basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and malignant melanoma (MM) were evaluated and compared regarding before and after COVID-19 pandemic

**Results:** Patients with BCC attending to the dermatology clinic were found to be younger in the pandemic period ( $p < 0.05$ ). Gender, duration of skin tumors, primary lesions, and their locations were found to be not statistically significant ( $p > 0.05$ ).

**Conclusion:** Patients with suspicious skin lesions could be encouraged to visit a hospital with appropriate COVID-19 protection. Alternatively, teledermatology could be used to evaluate whether the lesions should be excised or biopsied.

**Keywords:** Skin cancer; COVID-19; Hospital application; Biopsy

### 1. Introduction

COVID-19 disease was the most important threat to health when the World Health Organisation declared the novel coronavirus (COVID-19) outbreak as a global pandemic on March 11, 2020. In Türkiye, after March 11, 2020, people other than students and the working class refrain from going outside for about 1 year until vaccinations were completed. In that period hospitals were accepting patients other than COVID-19 illnesses, but the applications to hospitals were low compared to the previous year. Our aim was to define the effect of the pandemic on the applications of patients with skin cancer to dermatology clinic.

### 2. Material and Methods

In our study, the characteristics of patients, who applied to Izmir Atatürk Research and Education Hospital dermatology clinic, and from whom skin biopsies were taken, and resulted as basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and malignant melanoma (MM) were evaluated from the records of our clinic. The biopsies taken six months

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before and six months after March 11, 2020, were searched from the records. The evaluated patients' features were age, gender, duration of the skin tumor ( if it was recorded), primary lesion, and location of the lesion.

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 249, date 27.05.2021).

### 2.1. Statistical Analysis

The data were evaluated in the statistical package program IBM SPSS Statistics 25.0 (IBM Corp., Armonk, New York, USA). The normal distribution of the data of numerical variables was evaluated with the Shapiro-Wilk normality test and *Q-Q* graphs. Categorical variables were given as frequency and percentage. Descriptive statistics were given as Mean  $\pm$  Standard Deviation and Median (IQR) values. Mann Whitney *U* test was used to compare two independent groups of continuous variables for which the assumption of normal distribution was not met. The relationship between categorical variables was evaluated with the Continuity Correction test in 2 x 2 tables and the Pearson Chi-Square test in *r x c* tables. A value of  $p < 0.05$  was considered statistically significant.

### 2.2. Ethics committee approval

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 249, date 27.05.2021).

## 3. Results

Between March 11, 2020, and September 11, 2019, the number of skin biopsies taken in our dermatology clinic was 1613; between March 11, 2020, and September 11, 2020, the number of skin biopsies taken in our dermatology clinic was 564. Out of the total 2177 biopsies, 233 were diagnosed as basal cell carcinoma, squamous cell carcinoma, and malignant melanoma.

Diagnosed with BCC, there was a total of 159 patients, 84 women, and 75 men. The average age was  $70.57 \pm 12.59$  (mean  $\pm$  sd) for women and  $69.47 \pm 13.88$  (mean  $\pm$  sd) for men. Out of 159 patients, there was a total of 38 patients, 22 women and 16 men, with a known duration of the disease. Duration of disease was  $4.02 \pm 5.21$  years (mean  $\pm$  sd) in women and  $2.80 \pm 2.89$  years (mean  $\pm$  sd) in men. There were 119 patients between March 2020 and September 2019, and 40 patients between March 2020 and September 2020. The primary lesions and their numbers were as follows: papule, nodule, plaque, ulcerated papule, ulcerated nodule, ulcerated plaque, and multiple lesions; 48, 40, 8, 1, 42, 3, and 17, respectively. Locations of lesions and their numbers were as follows: nose, ear, forehead, cheek, trunk (hip, front trunk, back trunk, waist, neck), chin, upper lip, around the eyes (eyelids and canthal regions), temple, upper extremity (hand, arm), scalp, different regions; 62, 6, 12, 24, 10, 5, 2, 9, 9, 3, 6, and 11, respectively. Descriptive data of the patients with basal cell carcinoma were given in Table 1. Statistical analysis revealed that patients who applied to our dermatology clinic after March 11, 2020, were younger compared to the patients who applied before the pandemic ( $p < 0.05$ ) (Table 2).

**Table 1** Descriptive data of patients with basal cell carcinoma

	n (%)
<b>Gender</b>	
Female	84 (52.8)
Male	75 (47.2)
<b>Age</b>	
Female (Mean $\pm$ SD)	$70.57 \pm 12.59$
Male (Mean $\pm$ SD)	$69.47 \pm 13.88$
<b>Time (year)</b>	
Female (Mean $\pm$ SD) (n = 22)	$4.02 \pm 5.21$
Male (Mean $\pm$ SD) (n = 16)	$2.80 \pm 2.89$

<b>Group</b>	
March 2020- September 2019	119 (74.8)
March 2020- September 2020	40 (25.2)
<b>Primary lesion</b>	
Papule	48 (30.2)
Nodule	40 (25.2)
Plaque	8 (5.0)
Ulcerated papule	1 (0.6)
Ulcerated nodule	42 (26.4)
Ulcerated plaque	3 (1.9)
More than one lesion	17 (10.7)
<b>Location</b>	
Nose	62 (39.0)
Ear	6 (3.8)
Forehead	12 (7.5)
Cheek	24 (15.1)
Trunk (hip, front trunk, back trunk, waist, neck)	10 (6.3)
Chin	5 (3.1)
Upper lip	2 (1.3)
Around the eyes (eyelids and canthal regions)	9 (5.7)
Temple	9 (5.7)
Upper extremity (hand, arm)	3 (1.9)
Scalp	6 (3.8)
Different regions	11 (6.9)

**Table 2** Statistical analysis of features of patients with BCC according to the start of the pandemic

Variables	Before March 11, 2020, six months		After March 11, 2020, six months		p value
	n	Mean ± SD Median (IQR)	n	Mean ± SD Median (IQR)	
Age	119	71.24 ± 12,38 73.00 (16.00)	40	66.53 ± 14.95 67.50 (17.00)	<b>0.037<sup>+</sup></b>
Time (year)	29	2.79 ± 3.95 1.00 (2.00)	9	5.81 ± 5.12 4.00 (8.70)	0.100 <sup>+</sup>
	n (%)		n (%)		
Gender					0.616 <sup>*</sup>
Female	61 (51.3)		23 (57.5)		
Male	58 (48.7)		17 (42.5)		

Primary lesion			0.336 <sup>**</sup>
Papule	40 (33.6)	8 (20.0)	
Nodule	28 (23.5)	12 (30.0)	
Plaque	5 (4.2)	3 (7.5)	
Ulcerated papule	0 (0.0)	1 (2.5)	
Ulcerated nodule	30 (25.2)	12 (30.0)	
Ulcerated plaque	2 (1.7)	1 (2.5)	
More than one lesion	14 (11.8)	3 (7.5)	
Location			0.726 <sup>**</sup>
Nose	43 (36.1)	19 (47.5)	
Ear	4 (3.4)	2 (5.0)	
Forehead	8 (6.7)	4 (10.0)	
Cheek	20 (16.8)	4 (10.0)	
Trunk (hip, front trunk, back trunk, waist and neck)	9 (7.6)	1 (2.5)	
Chin	4 (3.4)	1 (2.5)	
Upper lip	2 (1.7)	0 (0.0)	
Around the eyes (eyelids and canthal regions)	5 (4.2)	4 (10.0)	
Temple	8 (6.7)	1 (2.5)	
Upper extremity (hand, arm)	2 (1.7)	1 (2.5)	
Different regions	9 (7.6)	2 (5.0)	
Scalp	5 (4.2)	1 (2.5)	

SD: Standard Deviation; IQR: Interquartile Range; \* Mann Whitney U test; \* Continuity Correction Test; \*\* Pearson Chi-Square test

Diagnosed with SCC, there was a total of 68 patients, 34 women and 34 men. The average age was  $74.59 \pm 11.62$  (mean  $\pm$  sd) for women and  $69.76 \pm 13.65$  (mean  $\pm$  sd) for men. Out of 68 patients, there was a total of 30 patients, 17 women and 13 men, with a known duration of the disease. Duration of disease was  $1.15 \pm 1.33$  (mean  $\pm$  sd) in women and  $1.21 \pm 2.65$  years (mean  $\pm$  sd) in men. There were 47 patients between March 2020 and September 2019 and 21 patients between March 2020 and September 2020. The primary lesions and their numbers were as follows: papule, nodule, plaque, ulcerated papule, ulcerated nodule, ulcerated plaque, multiple lesions; 14, 19, 6, 2, 13, 8, and 6, respectively. Locations of lesions and their numbers were as follows: nose, ear, forehead, cheek, around the eyes, temple, scalp, upper limb (hand, arm), trunk (hip, front trunk, back trunk, waist, neck), perineal, lips, lower extremity (leg, foot), and different regions; 7, 1, 4, 13, 2, 2, 4, 8, 4, 5, 4, 8, and 6, respectively. Descriptive data of the patients with squamous cell carcinoma were given in Table 3. There were not any statistically significant differences between the groups according to the six-month time frames (Table 4).

**Table 3** Descriptive data of patients with squamous cell carcinoma

	<b>n (%)</b>
<b>Gender</b>	
Female	34 (50,0)
Male	34 (50,0)
<b>Age</b>	
Female ( <i>Mean ± SD</i> )	74.59±11.62
Male ( <i>Mean ± SD</i> )	69.76±13.65
<b>Time (year)</b>	
Female ( <i>Mean ± SD</i> ) ( <i>n</i> = 17)	1.15±1.33
Male ( <i>Mean ± SD</i> ) ( <i>n</i> = 13)	1.21±2.65
<b>Group</b>	
March 2020- September 2019	47 (69.1)
March 2020- September 2020	21 (30.9)
<b>Primary lesion</b>	
Papule	14 (20.6)
Nodule	19 (27.9)
Plaque	6 (8.8)
Ulcerated papule	2 (2.9)
Ulcerated plaque	8 (11.8)
Ulcerated nodule	13(19.1)
More than one lesion	6 (8.8)
<b>Location</b>	
Nose	7 (10.3)
Ear	1 (1.5)
Forehead	4 (5.9)
Cheek	13 (19.1)
Around the eyes (eyelids and canthal regions)	2 (2.9)
Temple	2 (2.9)
Scalp	4 (5.9)
Upper limb (hand, arm)	8 (11.8)
Trunk (hip, front trunk, back trunk, waist, neck)	4 (5.9)
Perineal	5 (7.4)
Lips	4 (5.9)
Lower extremity (leg, foot)	8 (11.8)
Different regions	6 (8.8)

**Table 4** Statistical analysis of features of patients with SCC according to the start of the pandemic

Variables	Before March 11, 2020, six months		After March 11, 2020, six months		p value
	n	Mean ± SD Median (IQR)	n	Mean ± SD Median (IQR)	
Age	47	72,43 ± 12,94 73,00 (15,00)	21	71,62 ± 12,83 70,00 (18,00)	0,676+
Time (year)	23	1.42 ± 2.21 0.60 (0.70)	7	0.40 ± 0.11 0.40 (0.20)	0.096+
	n (%)		n (%)		
Gender					1.000*
Female	23 (48.9)		11 (52.4)		
Male	24 (51.1)		10 (47.6)		
Primary lesion					0.270++
Papule	7 (14.9)		7 (33.3)		
Nodule	12 (25.5)		7 (33.3)		
Plaque	4 (8.5)		2 (9.5)		
Ulcerated papule	2 (4.3)		0 (0.0)		
Ulcerated nodule	10 (21.3)		3 (14.3)		
Ulcerated plaque	8 (17.0)		0 (0.0)		
More than one lesion	4 (8.5)		2 (9.5)		
Location					0.392++
Nose	3 (6.4)		4 (19.0)		
Ear	1 (2.1)		0 (0.0)		
Forehead	2 (4.3)		2 (9.5)		
Cheek	10 (21.3)		3 (14.3)		
Around the eyes (eyelids and canthal regions)	0 (0.0)		2 (9.5)		
Temple	2 (4.3)		0 (0.0)		
Different regions	4 (8.5)		2 (9.5)		
Scalp	4 (8.5)		0 (0.0)		
Upper limb (hand, arm)	5 (10.6)		3 (14.3)		
Trunk (hip, front trunk, back trunk, waist, neck)	3 (6.4)		1 (4.8)		
Perineal	3 (6.4)		2 (9.5)		
Lips	3 (6.4)		1 (4.8)		
Lower extremity (leg, foot)	7 (14.9)		1 (4.8)		

SD: Standard Deviation; IQR: Interquartile Range; + Mann Whitney U test; \* Continuity Correction Test; ++ Pearson Chi-Square test

Diagnosed with malignant melanoma, there was a total of 6 patients, 2 women and 4 men. The average age was 79.50±4.95 (mean ± sd) for women and 57.75±8.14 (mean ± sd) for men. Out of 6 patients, there were 5 patients, with

a known duration of the disease. Duration of disease was  $0.60 \pm 0.56$  (mean  $\pm$  sd) in women and  $0.67 \pm 0.29$  years (Mean  $\pm$  SD) in men. There were 5 patients between March 2020 and September 2019, and 1 patient between March 2020 and September 2020. The primary lesions and their numbers were as follows: papule, nodule, ulcerated nodule, and ulcerated plaque; 1, 3, 1, and 1, respectively. Locations of lesions and their numbers were as follows: trunk, foot; 2, 4, respectively. Descriptive data of the patients with malignant melanoma were given in Table 5. The number of patients with melanoma was low, and we did not perform statistical analysis.

**Table 5** Descriptive data of patients with malignant melanoma

	<i>n</i> (%)
<b>Gender</b>	
Female	2 (33.3)
Male	4 (66.7)
<b>Age</b>	
Female ( <i>Mean <math>\pm</math> SD</i> )	79.50 $\pm$ 4.95
Male ( <i>Mean <math>\pm</math> SD</i> )	57.75 $\pm$ 8.14
<b>Time (year)</b>	
Female ( <i>Mean <math>\pm</math> SD</i> ) ( <i>n</i> = 2)	0.60 $\pm$ 0.56
Male ( <i>Mean <math>\pm</math> SD</i> ) ( <i>n</i> = 3)	0.67 $\pm$ 0.29
<b>Group</b>	
March 2020- September 2019	5 (83.3)
March 2020- September 2020	1 (16.7)
<b>Primary lesion</b>	
Papule	1 (16.7)
Nodule	3 (50.0)
Ulcerated nodule	1 (16.7)
Ulcerated plaque	1 (16.7)
<b>Location</b>	
Trunk	2 (33.3)
Lower extremity (foot)	4 (66.7)

#### 4. Discussion

The proportion of all skin biopsies taken was found to fall approximately one-third in our study, and a similar amount of fall was also seen for the skin cancers. The effect of the pandemic was expected to be the reason for this decrease. It was mentioned that, according to data obtained from *Google Trends*, during COVID-19, there was a decline in online search activity for skin cancer and melanoma, with a particular decline in search activity in March, April, and May [1]. It was stated that patients' interests shifting to that of COVID-19 is the reason for a reduction in online health and information-seeking behavior for skin cancer and melanoma, and could therefore be a factor that contributed to the observed decrease in skin cancer referrals [1].

In our study, we found patients with BCC applied to dermatology clinic were younger in the pandemic period. In the study of Lallas et al. with 598 patients with skin cancer, patients with melanoma and basal cell carcinoma were found to be significantly younger at the time of diagnosis in 2020 compared to those in previous years [2]. It was reported that patients with squamous cell carcinoma also showed a similar trend [2]. Authors associated patients being young with the growing concerns among older adults about COVID-19 [2]. In the pandemic, COVID -19 disease-associated deaths were reported to rise with age: 0.1% to 0.2% for individuals aged 20 to 44 years, 0.5% to 0.8% for individuals aged 45

to 54 years, 1.4% to 2.6% for individuals aged 55 to 64 years, 2.7% to 4.9% for individuals aged 65 to 74 years, 4.3% to 10.5% for individuals aged 75 to 84 years, and 10.4% to 27.3% for individuals aged  $\geq 85$  years [3]. In our study the number of patients with SCC and MM was low, and that could be the reason for not finding statistical significance in our patients with SCC.

We did not find significant differences in sex regarding the applications before and after the pandemic. In Lallas et al.'s study, a higher than anticipated percentage of women was reported during the pandemic period and the authors associated this with the men's growing concern over the serious COVID-19 consequences [2]. In Koh et al.'s study in 1992, about melanoma first detection in patients, men were reported as less likely than women to find their lesions (42 percent vs. 66 percent), and it was speculated that women might be more aware of potential changes to their skin [4]. Women with skin cancer predominance in the literature [2] after the pandemic could be the effect of both the pandemic and the tendency to detect skin cancer compared to men.

We did not find significant differences in primary lesion types and their locations before and after the pandemic. In the study from Ireland, it was stated that the Breslow thickness of melanomas increased during 2020's first two halves, and that was attributed to delayed presentations caused by recurrent lockdowns and the shutdown of medical services [5].

In the literature, there are studies, conducted before the pandemic, and hence the effects of the pandemic were not evaluated, concerning the factors affecting patients with skin cancers to apply to doctors. In our study, we did not interview with the patients to ask which factors led them to apply dermatology clinic. In Koh et al.'s study, a survey of 216 patients with melanoma was performed, and about half of melanomas were reported to be found by the patients themselves, in 25% of the cases, the spouse, a different family member, in the remaining 25% of cases, a medical professional's physical examination was mentioned to reveal the lesion [4]. Regarding suspicious pigmented lesions, 40 people were interviewed in Walter et al.'s study, it was reported that when a change was noticed by the patient, a small size typically indicated a lack of seriousness, and the choice to seek assistance was influenced by the co-occurrence of two or more changes, rapid growth, pain or lump [6]. In the same study, about half of the interviewees were reported to have no worries about their moles and had never thought that a mole could be a sign of a minor or serious illness; these individuals were described as being encouraged to seek assistance by worried spouses or other family members, or a medical professional had observed a lesion during a consultation for a different reason [6]. Future awareness campaigns were recommended to focus on the higher-risk demographics, like elderly men or single people, and encourage family and friends to be responsible in recognizing changes in moles and minimizing delays in seeking medical attention [6]. In De Giorgi et al.'s study, 802 melanoma patients were evaluated, and the authors reported that self-detection was linked to a higher likelihood of a thick melanoma and, consequently, a worse prognosis [7]. Self-examination with the help of a full-length mirror and a hand-held mirror was recommended for detection of early melanoma [8].

There could be also false beliefs that keep patients from going to a hospital. In a study, a survey was carried out for 123 patients who had visited the Plastic Surgery Clinic within the last 5 years due to tumors on their face; when asked if they thought that excising a lesion suspected of being neoplastic would accelerate the spread of the disease, 67 patients said "definitely yes" or "rather yes," while 45 patients were unsure, and eleven patients disagreed with this statement [9]. Fear of surgery was cited by the majority of the study participants ( $n = 85$ ) as the most significant factor contributing to the delay in starting treatment; the authors have stated, that social education is necessary to help people understand the risks associated with skin cancer development [9]. By informing patients that the surgery can be performed under local anesthesia or sedation, their fear of general anesthesia, and hence surgery could be alleviated.

Skin cancer treatment could be postponed according to the guidelines. For melanoma, according to NCCN (National Comprehensive Cancer Network) recommendation, patients with T0 to T1 tumors may postpone treatment for up to three months if after biopsy no macroscopic residual disease remains; patients with  $\geq T2$  disease may postpone treatment for up to three months if biopsy margins are negative [3]. Regarding SCC, according to ACMS (American College of Mohs Surgery), patients with small, well-differentiated cutaneous SCC and cutaneous SCC in situ may postpone treatment for up to three months; it was stated that prioritization should be given to patients with tumors that are enlarging, causing symptoms, or ulcerating; those with perineural involvement; those with poorly differentiated tumors; and those with patient-specific risk factors (such as an immunocompromised state) [3]. For BCC, it was stated that, if the patient is not experiencing severe symptoms, treatment of BCC tumors can be postponed for a minimum of three months [3]. Our patients' treatments were scheduled according to the guidelines.

Telemedicine to screen skin cancer was reported to be useful in determining which skin lesions carry high-risk features and which patients should be invited to the hospital to be treated as soon as possible in the COVID-19 pandemic [10]. Melanoma diagnosis delay could affect a patient's survival more than the risk of COVID-19 disease transmission. It was



reported that a delay of three months in diagnosing invasive melanoma was predicted to reduce the long-term 10-year cancer-specific net survival by 3.13% to 12.56% in patients aged 30-39 to 80+ years old, respectively [11].

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## 5. Conclusion

In our study, we found patients with BCC in the pandemic period were younger than before the pandemic, compatible with the literature. Society could be educated about skin cancer symptoms, skin examination, and about false beliefs not being true. Patients with suspicious skin lesions could be encouraged to visit a hospital with appropriate protection from COVID-19 or teledermatology could be used to evaluate whether the suspicious lesions should be excised, biopsied, followed, or patients invited to the hospital for physical examination.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

This study was conducted under the Helsinki criteria after approval by the Izmir Katip Çelebi University Ethics Committee (approval number: 249, date 27.05.2021).

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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