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Being a Cancer Patient during the Time of COVID-19: Impact of the Pandemic on the Anxiety and the Sleeping Quality of Oncology Patients

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Keywords
Anxiety · Cancer · COVID-19 · Oncology · Pandemic · Sleep quality

Abstract
Objective: In this study, we aimed to assess anxiety and sleep quality in cancer patients treated or followed up at our clinic at the time of the outbreak of the COVID-19 pandemic. ***Methods:*** Seven hundred and sixty-one patients who were either treated or followed up at our oncology clinic between April 2020 and May 2020 were included. Patients were assessed with the State-Trait Anxiety Inventory (STAI) and the Pittsburgh Sleep Quality Index (PSQI). ***Results:*** Mean scores of the 761 participants were STAI, 43.45 ± 9.34 (range, 23–75), and PSQI, 5.67 ± 4.24 (range, 0–19). Quality of sleep was found bad in 447 (58.7%) (global score ≥5). Univariate analyses demonstrated statistical differences by stage of cancer, status of treatment, subgroup of treatment, monthly income, and levels of education in anxiety and sleep quality levels. Multivariate analyses showed active treatment (OR: 21.4; 95% CI: 9.08–50.4; $p < 0.001$) as the major independent variable that affected sleep quality; the major independent variable associated with anxiety was low income (OR: 4.43; 95% CI: 1.69–11.5; $p = 0.002$). ***Conclusion:*** Anxiety and sleep quality levels were found comparable to pre-pandemic reports, and the pandemic was not observed to have additional negative impact on cancer patients. Also, universal basal anxiety and sleep disorder that accompany cancer or active treatment were observed in our study. The accurate effects of the pandemic can be analyzed in further studies using repeated data obtained from the same patient group.

Background

In Turkey, as in many countries, the infectious disease reported in the news was not expected to grow into a pandemic. In fact, majority of the Turkish public did not give much thought to this development until the first case was announced in Turkey on March 11. By this time, the number of affected countries had already risen to 114 and the number of cases to 118,000 across the world [1]. The pandemic quickly overburdened healthcare systems and resources, forcing countries to restructure their medical care routines, including those for cancer patients. Early information on case series from China and other coun-

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tries associated COVID-19 with high rates of morbidity and mortality in smokers, persons older than 65, or those with chronic systemic comorbidity. Apart from chronic systemic diseases, high mortality rates were also emphasized in persons with weakened immune system, including cancer patients [2].

Given that systemic immunosuppression caused by the cancer itself or its treatment make cancer patients more prone to infection [3], Oncology Associations worldwide began to announce the precautions that cancer patients should take against COVID-19. Further, guidelines with recommendations on the diagnosis, treatment, management, and follow-up of cancer patients were quickly released as the number of COVID-19 cases rose. Roadmaps were prepared on the social and psychological support that cancer patients would need.

Anxiety and sleep disorders in cancer patients can arise in 2 main ways: through biopsychosocial processes or because of the specific neuropsychiatric effects of certain cancer types or therapeutic agents. Possible losses, such as loss of hair, sexual function, and organ function during treatment; expectation for survival; and concerns about maintaining their role in their family and work lives can lead to long-term psychological stress [4]. Common physical side effects of conventional chemotherapies, like vomiting, mucositis, diarrhea, peripheral neuropathy, can also cause chronic psychological stress.

Cancer patients are already burdened with the disease and concerns about its course and treatment. How the breaking news about the rise in the global number of cases and how COVID-19 could affect the elderly and patients with lung cancer or immune system insufficiency [5] became a major concern. Despite the increasing reports on managing the diagnostic and therapeutic processes of cancer patients during the pandemic, how to audit and guide cancer patients psychologically was little discussed. In this context, we aimed to assess anxiety and sleep quality in patients who were actively treated or followed up at our oncology clinic in the early period of the pandemic.

Methods

The study was conducted at the Medical Oncology Clinic of Katip Çelebi University Hospital, which is a tertiary hospital in İzmir, Turkey. All participants included were outpatients with histopathologically proven cancer who were receiving treatment or on follow-up in April and May 2020. Study approval was obtained from the university's local Ethics Committee. Confused or agitated patients, patients with hearing impairment, delirium, or impaired level of consciousness, and patients with active or previous COVID-19 infection were excluded. Written informed consents were obtained from all participants. Sociodemographic and clinical information of each patient were retrieved from the hospital records.

Sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI), a reliable test with internal validity, also tested for Turkish by Ağargün et al. [6]. PSQI, a 19-item self-report questionnaire, evaluates sleep quality and quantity in adults in 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, usage of sleep medication, and daytime dysfunction. Each question is scored on a scale from 0 to 3, where 0 = very good, 1 = fairly good, 2 = fairly bad, and 3 = very bad. A global subjective sleep quality score from 0 to 21 is calculated, where higher scores indicate poorer sleep quality and higher levels of sleep disorder. A global score ≥5 clinically indicates significantly bad sleep quality. Diagnostic sensitivity and specificity of PSQI are 89.6% and 86.5%, respectively [7].

Anxiety levels of participants were quantified with the Turkish version of the Spielberger State-Trait Anxiety Inventory (STAI). This widely used reliable self-report test, which was originally developed by Spielberger in the 1970s, was translated and validated in Turkey by Öner and LeCompte [8]. STAI consists of 2 subscales: state anxiety and trait anxiety. The first subscale (20 items) measures state anxiety through questions about how subjects feel "right now," and the second subscale (20 items) measures trait anxiety through questions about how subjects feel "in general." Each response is scored between 1 and 4 to indicate the severity of the symptom. State and trait anxiety are scored separately. Both scores range from 20 to 80, with higher scores indicating a higher level of anxiety [9]. The accepted cutoff value of 44 was used to define a patient as clinically anxious [10].

The questions were asked in a simple and clear manner and thereby easily understood by all patients regardless of their literacy level. Both the PSQI and the STAI were filled out by the physicians in face-to-face interviews with patients.

Statistical Analyses

Analyses were conducted using the Statistical Package for Social Sciences for Windows 20.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics summarized frequencies and percentages for categorical, mean, and standard deviation for continuous variables. Independent samples *T* tests were used to compare categorical variables, trait anxiety, and PSQI scores between groups. Bonferroni post hoc comparisons were performed for analyses both within and between subjects. The *t* test and the ANOVA test were used to compare the continuous parameters of the groups based on good/bad sleep quality and STAI anxiety scores. Categorical parameters were compared via the χ^2 test. Spearman's correlation was used to evaluate the associations between anxiety/sleep quality and other parameters. Logistic regression was used to identify the parameters affecting sleep quality and/or anxiety. Statistical significance level was set at $p < 0.05$.

Results

In April–May 2020, 1,500 patients were screened and 1,114 were identified as eligible. Of these, 270 refused to participate because of lack of interest; 83 did not respond to all questions; and eventually, 761 were included in the analysis. Demographic and clinical characteristics of these patients are given in Table 1. Of the 761 patients, 480 (63.1%) are female and 281 (36.9%) are male. At the time of the study, their median age was 57.65 years (range, 20–90). Distribution of patients by cancer type is given in Table 1.

Mean scores of participants were STAI, 43.45 ± 9.34 (range, 23–75), and PSQI, 5.67 ± 4.24 (range, 0–19). Sleep quality was found bad in 447 (58.7%) (global score ≥5). No statistically significant differences were observed between the sleep quality scores of patients based on gender, parental status, or cancer type ($p > 0.05$) (Table 2). Comparison based on cancer stage, treatment status, treatment subgroup, monthly income, and education level showed statistically significant differences in the sleep quality of patients ($p < 0.005$) (Table 2). When patients were grouped based on gender – identified as an independent factor affecting sleep quality according to PSQI sub-components – sleep latency and sleep medication usage were significantly higher among women, but there were no significant differences on other scales ($p = 0.01$; $p = 0.039$).

Subgroup analysis of PSQI scores based on cancer stage and treatment status showed significance in all subcomponents ($p < 0.05$). Analysis by education level revealed significant differences in subjective sleep quality, sleep latency, sleep disturbance, and daytime dysfunction. Monthly income levels were also found to be correlated with subjective sleep quality, sleep latency, sleep disturbance, daytime dysfunction, as well as sleep medication usage ($p < 0.05$).

In total, 44.2% of the patients ($n = 336$) presented with clinically high levels of anxiety. One-way ANOVA analysis showed significant interaction effect between the stage of the cancer and the level of anxiety ($p < 0.001$). Post hoc results showed significant increase in anxiety scores in metastatic diseases (Mdif = −8.020, $p < 0.001$). Analysis of STAI scores based on education level showed that STAI scores decreased as education level increased ($p < 0.001$); STAI scores of university graduates were significantly lower than primary school graduates (Mdif = 4.680, $p < 0.001$). Comparable correlation was found between STAI scores and monthly incomes, where anxiety decreased as income increased ($p < 0.001$). Correlations between STAI scores and patient characteristics are given in Table 2.

Comparison of treatment groups based on STAI and PSQI scores showed significant differences between treatment subgroups and their respective STAI and PSQI scores ($p < 0.001$). The results of post hoc analyses are shown in Table 3.

Table 1. Demographic characteristics of patients

Sociodemographic characteristics	Patients (n = 761)
Age (mean ± SD; min–max)	58±11.67 (20–90)
Gender, n (%)	
Female	480 (63.1)
Male	281 (36.9)
Education, n (%)	
Primary school	528 (69.4)
High school	167 (21.9)
University	66 (8.7)
Monthly income, n (%)	
TL 1,000–1,500	212 (27.9)
TL 1,500–3,000	360 (47.3)
TL 3,000–5,000	142 (18.7)
TL 5,000+	47 (6.2)
Working status, n (%)	
Working	183 (24)
Retired	236 (31)
Not working	342 (44.9)
Children, n (%)	
Yes	680 (89.4)
No	81 (10.6)
Stage, n (%)	
Local disease	354 (46.5)
Local advanced disease	31 (4.1)
Metastatic disease	376 (49.4)
Receiving treatment, n (%)	
Yes	660 (86.7)
No	101 (13.3)
Type of cancer, %	
Breast	38.2
Gastrointestinal system	26.8
Genitourinary	16.4
Hepatobiliary	8.4
Lung	5
Other	5.2

Spearman's correlation analysis showed correlations between PSQI and STAI scores ($r = 0.824$, $p < 0.001$). We also conducted multivariate analyses to assess the factors affecting anxiety and sleep quality. Logistic regression model analysis for anxiety showed being female (OR: 1.45; 95% CI: 1.04–2.00; $p = 0.025$), having metastatic disease (OR: 3.31; 95% CI: 2.41–4.55; $p < 0.001$), being primary school graduate (OR: 1.87; 95% CI: 1.28–2.72; $p = 0.001$), and having a monthly income of TL1,000–1,500 (OR: 4.43; 95% CI: 1.69–11.5; $p = 0.002$) were independent variables. A second logistic regression model analysis showed being primary school graduate (OR: 1.96; 95% CI: 1.38–2.79, $p < 0.001$), having metastatic disease (OR: 2.63; 95% CI: 1.88–3.67; $p < 0.001$), and receiving active treatment (OR: 21.4; 95% CI: 9.08–50.4; $p < 0.001$) were independent variables affecting bad sleep quality.

Table 2. Distribution of sleep quality and anxiety by patient characteristics

	PSQI	*f*	*p* value*	STAI	*f*	*p* value*
Gender						
Female	5.81±4.26	0.567	0.238	43.66±9.56	1.233	0.406
Male	5.43±4.21			43.08±8.96		
Education						
Primary school	6.04±4.15	7.222	**0.001**	44.77±9.05	7.557	**<0.001**
High school	4.96±4.19			41.74±9.00		
University	4.45±4.24			40.09±8.82		
Monthly income						
TL1,000–1,500	6.21±4.05	5.93	**0.001**	45.08±10.04	8.508	**<0.001**
TL1,500–3,000	5.88±4.36			43.88±9.32		
TL3,000–5,000	4.93±4.06			41.42±7.95		
TL5,000+	3.92±4.03			38.95±7.75		
Children						
Yes	5.71±4.24	0.756	0.385	43.60±9.36	1.738	0.188
No	5.28±4.24			42.16±9.13		
Stage						
Local disease	3.98±3.92	65.811	<**0.001**	39.33±9.55	81.433	**<0.001**
Local advanced disease	5.06±3.81			43.25±8.26		
Metastatic disease	7.30±3.92			47.35±7.35		
Receiving treatment						
Yes	1.31±2.10	146.037	**<0.001**	45.25±8.39	9.202	**<0.001**
No	6.33±4.09			31.65±6.06		
Treatment subgroup						
No treatment	1.31±2.10	53.552	**<0.001**	31.65±6.06	94.33	**<0.001**
HRT	4.16±4.04			39.43±9.06		
CT	6.98±3.93			47.03±7.54		
Oral CT	6.41±4.10			45.09±7.86		
TKI	5.86±3.49			44.17±6.78		

PSQI, Pittsburgh Sleep Quality Index; STAI, State-Trait Anxiety Inventory; TKI, tyrosine kinase inhibitor; CT, chemotherapy; HRT, hormonotherapy. * ANOVA.

Discussion

The purpose of our study was to assess and identify anxiety and sleep disorder levels in cancer patients in treatment or in follow-up care at our oncology clinic during the outbreak of the pandemic. The diagnosis of cancer and its subsequent therapies can affect anxiety levels, hence deteriorate patients' life quality, and challenge their adaptation to the treatment [11]. Alacacioglu et al. [12] reported higher mean STAI anxiety levels in cancer patients (41.9 ± 8.8) than in the normal population (40.0 ± 2.5) in Turkey. Various factors, including the timing of the diagnosis and the history of the disease, can affect anxiety in cancer patients. Previous (pre-pandemic) studies report anxiety rates as high as 50% in recently diagnosed patients and chronic anxiety rates of about 30% in survivors [13]. The 17.9–33% anxiety prevalence reported by a 2015 review in breast cancer patients may suggest a rise in anxiety in the recent years [14]. In their report of a literature review including 20 studies, Brandenbarg et al. [15] reported the prevalence of anxiety ($N = 7$) among oncology patients to range from 3.4% to 43.0% (pooled prevalence: 21.0%). Previous studies in the literature showed varied levels of anxiety among cancer patients [4]. The differences in the anxiety and sleep disorder rates reported by different studies may be due to the different psychometric properties of measurement tools/tests; the different criteria used for defining anxiety and sleep disorders; or socio-economic differences, differences in types and stages of cancers, treatment modes, presence of recurrence, support level of family, patients' economic levels and cultural backgrounds, education levels, place of residence, other chronic diseases, history of psychiatric disorders, etc. [16, 17].

In our study, 44.2% of the patients were found to suffer from anxiety (43.45 ± 9.34) during COVID-19 pandemic.

Table 3. Correlation of treatment subgroups with anxiety and sleep quality

Treatment (i)	Treatment (j)	STAI		PSQI	
		mean difference (I-J)	*p* value	mean difference (I-J)	*p* value
CT	No treatment	15.377	**<0.001**	5.672	**<0.001**
	HRT	7.600	**<0.001**	2.827	**<0.001**
	TKI	2.858	0.515	1.126	1.000
	Oral CT	1.933	0.876	0.577	1.000
HRT	No treatment	7.7773	**<0.001**	2.844	**<0.001**
	CT	−7.6003	**<0.001**	−2.827	**<0.001**
	TKI	−4.7416	**0.026**	−1.700	0.278
	Oral CT	−5.6672	**<0.001**	−2.250	**0.003**
TKI	No treatment	12.518	**<0.001**	4.545	**<0.001**
	CT	−2.858	0.515	−1.126	1.000
	HRT	4.741	**0.026**	1.700	0.278
	Oral CT	−0.925	1.000	−0.549	1.00
Oral CT	No treatment	13.444	**<0.001**	5.094	**<0.001**
	CT	−1.933	0.876	−0.577	1.000
	HRT	5.667	**<0.001**	2.250	**0.003**
	Oral CT	0.925	1.000	0.549	1.000
No treatment	CT	−15.377	**<0.001**	−5.672	**<0.001**
	HRT	−7.777	**<0.001**	−2.844	**<0.001**
	TKI	−12.518	**<0.001**	−4.545	**<0.001**
	Oral CT	−13.444	**<0.001**	−5.094	**<0.001**

STAI, State-Trait Anxiety Inventory; PSQI, Pittsburgh Sleep Quality Index; TKI, tyrosine kinase inhibitor; CT, chemotherapy; HRT, hormonotherapy.

Studies conducted in China during the pandemic reported an anxiety rate of 28.8% in the general population [18] and 17.7% in oncology patients [19]. In our study, similar to the results of the referred studies from China, the COVID-19 pandemic was not seen to aggregate the anxiety of Turkish oncology patients. In fact, Özdin et al. [20], in their study on anxiety associated with COVID-19 in the general Turkish public, report this rate as 45.1%. These comparative results suggest that the COVID-19 pandemic has, so far, not imposed additional anxiety on Turkish oncology patients. Unlike the general population, anxiety disorders in cancer patients are not associated with age or gender [21]. Likewise, our study did not reveal any correlation between anxiety and age or gender. There are, however, different reports on this issue. A study conducted with young adult cancer patients reported an anxiety rate of 42.2% with a higher prevalence among women [22]. Hinz et al. [23] also reported higher anxiety rates among women.

Sleep disorders are twice common among cancer patients versus the general population [24] and known to impact their life quality and psychological wellness. Cancer-related sleep disorders have been addressed in many studies [25–27]. Sleep disorders can be assessed subjectively with methods involving self-report instruments and sleep diaries and objectively with methods like polysomnography and actigraphy [28].

While 58.7% of the patients reported bad sleep quality in our study, we do not have comparative data since this is our first study investigating the sleep quality of oncology patients during the pandemic. Previous studies reported insomnia prevalences between 23–62% and 24–95% with higher rates in cancer patients versus the healthy general population [29]. The results of our study are consistent with those reported in the literature, with no worsening identified in association with the COVID-19 pandemic. Yet, while, in general, sleep quality was not seen to vary between individuals who stayed at home and worked actively in the Turkish society, sleep quality was seen to have worsened among healthcare professionals.

Demographic characteristics such as age, gender, personality traits, continuous maladaptive sleep behavior, personal, and familial histories are among the important factors precipitating insomnia in cancer patients, also important are predisposing factors such as type and stage of cancer, physical, and psychological symptoms [30]. In our study, no correlation was found between sleep disorder and gender, having children, or cancer type. Some studies report insomnia to be more common among the elderly and others report that this is not always the situation [31]. We, too, did not find any statistical differences based on age.

Anxiety and sleep problems can present at all phases, even after the treatment [28, 32]. Whereas the diagnosis alone can lead to a host of psychological problems, more reasons may come with active treatment. Cancer treatment regimens can lead to changes in daily routine, decrease in life quality, memory loss, and impaired interpersonal relationships [33]. Such changes can be attributed to the effects of the nature of the disease, the duration of the treatment, and the presence of concomitant cancers. Our study showed higher levels of anxiety and worse sleep quality among patients in active treatment who are likely to experience more stress because of the disease itself and the side effects of the treatment. Different cross-sectional data from the same patient group in the course of the pandemic are needed to associate the increased anxiety and sleep disorder with the COVID-19 pandemic.

A study from China which evaluated 1,600 persons from the general population in Wuhan in February 2020 found symptoms of anxiety in 8.3% and depression in 14.6% [34]. While anxiety and depression rates were 12.9% and 22.4%, respectively, among individuals who were quarantined, the same rates were 6.7% and 11.9%, respectively, among those who were not. Low income and education levels, intense anxiety about getting infected, lack of psychosocial support, poor perception of own health and all were associated with high levels of anxiety and depression. In our study, low income and education levels were also associated with anxiety and sleep disorder. Low education level can lead to inability to accurately interpret the disease-related information, unawareness about the transmission paths or the ways of protection, and to difficulty in understanding the information provided by the physician. This increases anxiety and sleep disorder in patients with low education levels. Likewise, low-income level can increase anxiety and sleep disorder due to lack of housing, nutrition, or personal protective equipment.

Our study, which defines the first such data in Turkish cancer patients, revealed anxiety and sleep disorder rates comparable to those reported before the COVID-19 outbreak. This can be attributed to the controlled monitoring of the number and the prognosis of the cases in Turkey; nonetheless to the fact that the Ministry of Health instructed healthcare workers such as Hematology and Oncology teams that manage immunosuppressive cases should not be involved in COVID-19 cases; hence, patients feel safe in the hospital. Additionally, since cancer patients already had to observe preventative measures to protect themselves before the outbreak, it is conceivable that cancer patients would more easily adapt than others to social and physical distancing or wearing mask. In fact, oncology patients seem to find it a positive change that use of personal protective equipment and personal hygiene rules has become more widespread. Another issue is that the Turkish society has a more fatalistic approach to cancer compared to many Western societies, and this reveals itself in extensive social support to patients. This fatalistic and faith-based approach is seen to be applicable also during the pandemic. Most patients believe that Islamic cleaning rules already provide the necessary criteria for personal hygiene and the preventative measures for COVID-19. This perspective eliminates any additional causes for anxiety and sleep disorder that may arise due to the pandemic. While cancer patients may experience intense anxiety and sleep disorder because of the disruption in their treatment, worsening of disease, lack of information, and lack of palliative support, hospital visits are where they get information, consultation, symptomatic control, and treatment. That patients experienced no interruption in their treatment at our clinic, despite the pandemic, could visit their doctors with special permission even during curfew hours, and keep up with their follow-up schedule, all have influenced our results that showed no significant increase in anxiety or sleep disorder levels. Further, each patient followed up by our clinic was given detailed information about the course of the pandemic and detailed consent forms for COVID-19 were prepared for the patient groups in treatment.

This report presents the results of a study conducted in the early months of the pandemic and does not involve follow-up surveys that reflect the outcomes as the number of cases and the course of the pandemic changed in Turkey. Following-up on the same patients through surveys to monitor their levels of anxiety and sleep disorder would be valuable since the course of the pandemic could be taken as the only variable. Therefore, the PSQI and STAI of those patients in treatment that have participated in this first study are being repeated during their routine visits to compare the results. In other words, this is an ongoing study and data collection continues. Another limitation of the study is the absence of any questions inquiring about any COVID-19 cases in or around their families. The difference between the number of patients in treatment and the number of patients on follow-up can also be considered a limitation. The number of patients in treatment is higher because both the Ministry of Health and the Turkish Society of Medical Oncology did not recommend patients on follow-up to visit their hospital unless they have a complaint.

To conclude, the pandemic does not seem to adversely affect anxiety and sleep quality in our study group. While our results are comparable to those reported by previous studies conducted with cancer patients, this may be due to the absence of COVID-19-positive cases in the families or the immediate environment of our patient population – as mentioned we lack data in this aspect. In our next study, which is planned as a follow-up study, we will analyze the data from the repeated PSQI and STAI of the same patients in line with the course of the pandemic and address the issue of COVID-19-positive cases in their environment. Publications that report on the emotional and psychological conditions of oncology patients in different countries are needed in this time of a pandemic, which has been ravaging the globe since December 2019, and as the number of cases is once more on the rise.

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Statement of Ethics

The study was approved by the Institutional Review Board at Izmir Katip Çelebi University (May 8, 2020; the ethical approval number: 2020-GOKAE-0227). All patients provided written informed consent to participate in the study. Patients signed informed consent regarding publishing their data.

Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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Author Contributions

Study concept was contributed by Z.G. Güç and A. Alacacıoğlu. Study design was contributed by Z.G. Güç and A. Alacacıoğlu. Data acquisition was contributed by Z.G. Güç, U. Oflazoğlu, Y. Yıldız, M.G. Yazır, M.E. Kalender, and S. Ünal. Quality control of data was contributed by Z.G. Güç, T. Salman, and Y. Küçükzeybek. Data analysis and interpretation were contributed by Z.G. Güç, A. Alacacıoğlu, and Y. Küçükzeybek. Statistical analysis was contributed by Z.G. Güç, A. Alacacıoğlu, and H. Ellidokuz. Manuscript editing was contributed by A. Alacacıoğlu and Y. Küçükzeybek. Manuscript review was contributed by A. Alacacıoğlu, Y. Küçükzeybek, T. Salman, and M.O. Tarhan.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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