RESEARCH ARTICLE

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Being a Medical Student in the Shadow of a Pandemic: Psychological Reactions of Medical Students in the COVID-19 Pandemic and Their Views on Online Learning

ABSTRACT

Objective: In this study, it is aimed to determine the psychological reactions of pre-clinical medical school students to the COVID-19 pandemic and their views on online learning.

Methods: A cross-sectional study was conducted on 722 medical students. Data were collected with an online questionnaire between 20 and 27 December 2020. A data collection form including questions about sociodemographic characteristics, opinions about online learning, the Impact of Event Scale-Revised, and the Insomnia Severity Index scales was used.

Results: The mean age of the participants was found to be 20.7±1.6 years. 393 (54.4%) of them were women. 671 (92.9%) of the students stated that they were concerned about the disruption of their education due to the pandemic, and 76.3% (n=551) preferred the face-to-face education environment in their schools to the online learning environment. Of the students, 181 (25.1%) had symptoms of post-traumatic stress disorder (PTSD) and 171 (23.6%) had symptoms of insomnia. The probability of posttraumatic stress disorder was higher in women than in men (OR=1.489, 95% CI=1.02-2.16; p=0.038). In those who have relatives who have contracted COVID-19, compared to those who have not (OR=1.489.95% CI=1.02-2.16; p=0.038), and those with an increased fear of COVID-19 transmission to their relatives were less likely to have PTSD symptoms than those with or without (OR=0.523, 95% CI=0.339-0.807; p=0.003). In addition, those who followed the news about COVID-19 from social media were more likely to have symptoms of PTSD in October than those who followed it from other sources (OR=0.662, 95% CI=0.461-0.951; p<0.001). The probability of PTSD symptoms was significantly higher in students who had high anxiety about the disruption of their education due to the pandemic than in those who had little or no (OR=1.310, 95% CI=1.111-1.543; p=0.001).

Conclusions: Medical students are experiencing the psychological effects of the pandemic and are seriously concerned about the disruption of their education.

Keywords: Medical Student, Online Learning, Post-Traumatic Stress, Insomnia, COVID-19 Pandemic.

Pandeminin Gölgesinde Tıp Öğrencisi Olmak: Tıp Öğrencilerinin COVİD-19 Pandemisine Karşı Psikolojik Tepkileri Ve Uzaktan Eğitimle İlgili Görüşleri

ÖZET

Amaç: Bu çalışmada, preklinik dönem tıp öğrencilerinin Covid-19 pandemisine karşı psikolojik tepkilerinin ve uzaktan eğitimle ilgili görüşlerinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Gönüllü 722 öğrenci ile kesitsel bir çalışma yapıldı. Veriler 20-27 Aralık 2020 tarihleri arasında, çevrimiçi bir anket aracılığıyla toplandı. Veri toplama aracı olarak sosyodemografik bilgiler ve uzaktan eğitimle ilgili görüşlere yönelik bir soru formu, Revize Olayların Etkisi Ölçeği ve Uykusuzluk Şiddeti Ölçeği kullanıldı.

Bulgular: Katılımcıların yaş ortalaması 20,7±1,6 ve 393'ü (54,4%) kadındı. Öğrencilerin 671'i (92,9%) eğitimlerinin aksaması ile ilgili kaygılandığını, %76,3'ü (n=551) okullarındaki eğitim ortamını uzaktan eğitim ortamına tercih ettiğini belirtti. Öğrencilerin 181'inde (25,1%) travma sonrası stress hastalığı (PTSD) semptomları, 171'inde (23,6%) uykusuzluk semptomları bulunmaktaydı. Travma sonrası stres hastalığı olasılığı kadınlarda erkeklere göre (OR=1.489, 95% CI=1.02-2.16; p=0,038) daha fazlaydı. Covid-19'a yakalanan akrabası olanlarda olmayanlara göre (OR=1.489, 95% CI=1.02-2.16; p=0,038), yakınlarına Covid-19 bulaşma korkusu fazla olanlarda az olan veya olmayanlara göre (OR=0.523, 95% CI=0.339-0.807; p=0.003) PTSD semptom olasılığı daha fazlaydı. Ek olarak, Covid-19 ile ilgili haberleri sosyal medyadan takip edenler öğrencilerde diğer kaynaklardan takip edenlere göre (OR=0.662, 95% CI=0.461-0.951; p<0,001 PTSD semptom olasılığı daha yüksekti. Eğitimlerinin aksaması konusunda kaygıları fazla olan öğrencilerde, az olan veya olmayanlara göre PTSD semptom olasılığı anlamlı şekilde daha yüksekti (OR=1.310, 95% CI=1.111-1.543; p=0,001).

Sonuç: Tıp öğrencileri pandeminin psikolojik etkilerini yaşamakta, eğitimlerinin aksaması konusunda ciddi olarak kaygılanmaktadırlar.

Anahtar Kelimeler: Tıp Öğrencisi, Uzaktan Eğitim, Travma Sonrası Stres, Uykusuzluk, Covid-19 Pandemisi.

INTRODUCTION

We are witnessing an extraordinary period in which a disease that first appeared in Wuhan, China, on 31 December 2019 and spread rapidly, paralyzed life all over the world (1). The World Health Organization defined this disease as COVID-19 and declared it a global pandemic on 11.03.2020 (2). On the same date, the first COVID-19 case was seen in Turkey (3). At the time that this article was written the number of cases in Turkey exceeded 2 million, and nearly 20 thousand deaths occurred (4).

Since the beginning of the pandemic, everything has changed rapidly in the globalizing world. The COVID-19 pandemic had profound effects on social, cultural, economic, and other areas of life, especially health and education (5). Education was interrupted at all levels first, followed by online learning (OL). However, neither students nor trainers had OL experience. In this process, uncertainties about how education will be, how exams will be held, how long the restrictions and changes made due to the pandemic will last, as well as economic problems, the increasing number of COVID-19 cases and deaths negatively affected the psychological state of medical students and all segments of the society. All these developments bring along various mental health issues and insomnia (6).

The Covid-19 pandemic has created a state of fear all over the world. The large number of unknowns related to the disease, the lack of an effective vaccine or treatment, its rapid spread, causing death, mask and social distancing practices, quarantine and restrictions have caused various psychological problems in all parts of society for reasons such as (7).

It has been predicted that the pandemic will create a global crisis in terms of community mental health and will have more severe consequences for public health in the long term than the effects of infection (8, 9).

Medical students, doctors of the future, closely monitored this whole process and, naturally, were impressed. In addition to the factors mentioned above, factors such as the evacuation of university campuses, online training and exams, disruption of practical training, frequent use of social media as a source of socialization and information acquisition, increased screen activities, uncertainty in medical students have further increased these problems.

Studies show that university students are vulnerable to psychological problems in the pandemic, and online learning, quarantine, and restrictions have a significant impact on students' anxiety levels (10). In a study, it was suggested that the psychological consequences that develop due to the pandemic in students may be serious, and psychological interventions are necessary to reduce the stress that students feel and improve their sleep quality (11). The stress caused by the pandemic is an important factor for insomnia. Studies have shown that insomnia is 3 times more common in people who experience severe stress. On the other hand, both stress and insomnia also interfere with learning (12). Zhou et al.in the study, it was found that 25.7% of university students experienced sleep problems during the COVID-19 pandemic process (13).

Post Traumatic Stress Disorder (PTSD) is a constant state of arousal and alertness after an event that causes severe stress. Activation of the hypothalamic-pituitary-adrenal axis due to stress experienced during traumatic events leads to insomnia. For this reason, PTSD is closely related to sleep disorders. In PTSD, difficulty falling asleep, frequent waking up at night, daytime drowsiness are frequent. The increase in cortisol due to insomnia makes it a vicious circle. Conversely, sleep disorders also affect mental health and cause stress and a vicious circle in the process (14, 15).

Although many studies have been conducted from different countries on the effects of the pandemic on the mental health of various population segments, studies about the psychological impact and the needs of medical students are relatively limited. These studies are usually studies related to mental problems such as anxiety, anxiety, stress, depression, burnout (16-19). Studies focusing on insomnia and PTSD in medical students are relatively limited (11, 13). In our study, it is aimed to investigate the psychological effects of the Covid-19 pandemic on medical students with insomnia and PTSD symptoms and to determine the opinions of students about online learning. The questions of our research are as follows:

1. How often are PTSD symptoms and insomnia Dec the pandemic period among medical students and what are the associated factors?

2. What are the opinions of medical students about online learning?

MATERIAL AND METHODS

Ethical Consent: Ethical permissions were taken from the Atatürk University Clinical Research Ethics Committee (IRB Number: B.30.2.ATA.0.01.00-10/14, Date: 17.12.2020). The study was carried out per the rules of the Helsinki Declaration.

Study Setting and Participants: This is a cross-sectional study performed on the preclinical students of Atatürk University Faculty of Medicine between 20 and 27 December 2020. Participation in the study was provided voluntarily. No printed material was used due to pandemic conditions. The data was collected through an online questionnaire prepared by the authors. It was sent to the students via e-mail, WhatsApp, and other social media accounts. Students were informed about the purpose of the study and invited to participate in the online survey. The first item of the survey was "I accept to participate in the study voluntarily." Thus, online informed consent was achieved. A total of 962 students studying in grades 1, 2, and 3 were invited to participate in the survey. As a result, 722 students responded, making 75% of the population.

Data Collection Tools: A questionnaire composed of four sections was used for data collection:1) sociodemographic characteristics 2) views on online learning 3) The Impact of Event Scale-Revised, and 4) the Insomnia Severity Index.

The Impact of Event Scale-Revised (IES-R): It is a 22-item scale developed by Weiss and Marmar to measure the level of post-traumatic stress and used in community surveys (20). The scale uses a 5-point Likert scale ranging from not at all (0) to extremely (4). Total scores are between 0 and 88. The Turkish adaptation of the scale was performed by Corapcıoglu et al. (2006) (21). Accordingly, a score ≥33 shows that the person's level of stress is high. We calculated the Cronbach alpha value of IES-R as 0.92.

Insomnia Severity Index (ISI): The Insomnia Severity Index (ISI) is a scale developed by Morin (2011) to determine the severity of insomnia symptoms (22). Its Turkish adaptation was performed by Boysan et al. (2010) (23). The scale consists of seven items scored on a 5-point Likert system, ranging from 0 to 4. The total scale

scores can range between 0 and 28. While 0-7 points indicate insignificant insomnia, 8-14 points are categorized as clinical insomnia, 15-21 points as moderate insomnia, and 22-28 points as severe insomnia.

IES-R is one of the most commonly used measurement tools in studies evaluating the mental health of health professionals during viral epidemic periods. In our study, it was decided to use IES-R as a measurement tool, and considering the relationship of PTSD with sleep, it was preferred to use it together with the ISI scale (17).

Statistical Analysis: Data were analyzed using the SPSS 20.0 software (SPSS Inc., Chicago, IL, USA), and presented as mean, standard deviation, median, minimum, maximum, percentage, and frequencies. Verilerin normal dağılıma uygunluğu Kolmogorov Smirnov testi ile kontrol edildi ve normal dağıldığı görüldü. Comparisons between categorical variables were performed with the Chi-Square test. In multivariate analysis, predictive risk factors between groups were examined by logistic regression analysis using possible risk factors identified in univariate analyzes. Adjusted odds ratios (ORs) and 95% confidence intervals (CI) were calculated. The test reliability was estimated using Cronbach α. A p-value of <0.05 was considered statistically significant.

RESULTS

Participants' Sociodemographic Characteristics and Responses Concerning COVID-19: The mean age of the participants was 20.7±1.6 years. Sociodemographic results are presented in Table 1.

Table 1. Sociodemographic characteristics of the participants

Variable		n	%
Sex	Female	393	54.4
	Male	329	45.6
Study year	1st grade	159	22
	2nd grade	278	38.5
	3rd grade	285	39.5
Residency place	At home (with family)	686	95
	At a student housing (with friends)	19	2.6
	At a student housing (alone)	7	1,0
	Dormitory	10	1.4
What is your level of knowledge about COVID-19?	Little	37	5.1
	Medium	249	34.5
	Enough	404	56
	Very well	32	4.4
Have you had COVID-19?	Yes	2	0.003
	No	722	99.7
Have any of your family members had COVID-19?	Yes	128	17.7
	No	594	82.3
What is your level of anxiety about the infection of your relatives with COVID-19?	None	13	1.8
	Little	131	18.1
	Middle	275	38.1
	High	303	42
What is your level of anxiety about infecting yourself with COVID-19?	Little	56	7.8
	Moderate	306	42.4
	Severe	227	31.4
	Extremely severe	133	18.4
What do you think about online learning?	Bad	277	38.4
	Middle	279	38.6
	Good	166	23
With which device do you attend the online learning sessions? †	I can't connect	5	0.7
	Smartphone	454	62.9
	PC	455	63
	Tablet	36	5
Is your internet quota limited?	Yes	244	33.8
	No	478	66.2
Has your daily screen time increased during the pandemic?	Yes	683	94.6
	No	39	5.4
What is your daily screen time during the pandemic? (on TV, smartphone, PC, tablet)	Less than 1 hour	9	1.2
	1-5 hours	233	32.2
	5-10 hours	415	57.4
	More than 10 hours	65	9
What is your level of anxiety about the interruption of your education?	None	51	7.1
	Little	105	14.5
	Middle	222	30.7
	High	344	47.7
What is your mostly-used source of information about COVID-19? †	TV	549	76
	Internet	584	80.9
	Social media	536	74.2
	Website of the ministry of health	280	36
	WHO's website	137	19

† multiple options selected

Opinions about Online Learning during the Pandemic: While 59.6% of the students (n=430) were happy with the online learning, 553 (76.3%) preferred the on-site educational environment in their school to online lectures. Students' perceptions about online learning are presented in Table 2.

Prevalence of Post-traumatic Stress Disorder (PTSD) and Insomnia: The mean IES-R score of the students was 24.5±15.1 (0-88), and the mean ISI score was 10.4±5.5 (0-28). The PTSD and insomnia prevalence was 25.1% and 23.6% respectively (Figure 1). No significant correlation was found between insomnia and PTSD (p=0.819).

Table 2. Students' perceptions about online learning

Perceptions	Agree n (%)	Disagree n (%)
I prefer OL to face-to-face lessons.	247 (34.2)	475 (65.8)
I am satisfied with OL.	430 (59.6)	292 (40.4)
I believe DE will be improved gradually.	531 (73.5)	191 (26.5)
OL must be interactive.	411 (56.9)	311 (43.1)
After the pandemic, some of the courses should continue as OL.	348 (48.2)	374 (51.8)
I'm happy with the learning environment in OL.	383 (53)	339 (47)
I prefer the educational environment in my school to OL.	551 (76.3)	171 (23.7)
I have internet access problems during OL.	316 (43.8)	406 (56.2)
I'm worried about what the exams are going to be like.	699 (96.8)	23 (3.2)
I'm worried that my practical learning will be incomplete.	647 (89.6)	75 (10.4)
I think my education will be incomplete due to OL.	599 (83)	123 (17)

OL: Online learning

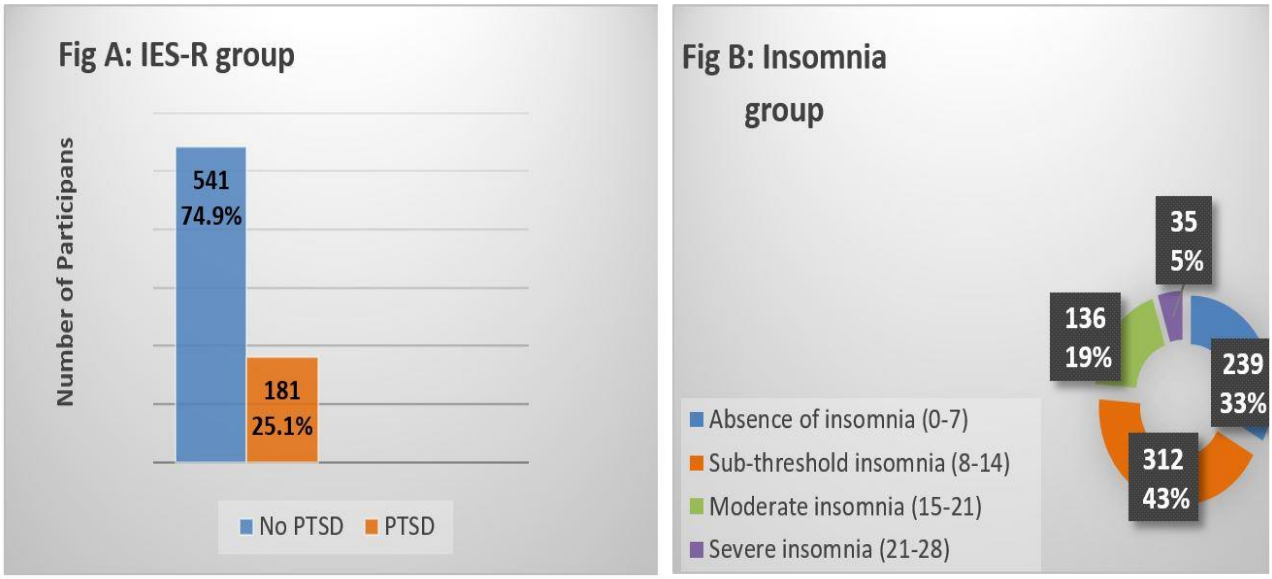

Figure 1. A) PTSD symptom prevalence, B) Insomnia symptom prevalence

The Relationship of PTSD and Insomnia with other Variables: PTSD was significantly higher in women compared to men (p=0.048), in those with acquaintances with COVID-19 compared to those without (p<0.001), in those who had a fear of having COVID-19 in their relatives compared to those did not have such fear (p<0.001), those following COVID-19-related news on social media compared to those who did not follow such news (p=0.004), those who had a high level of anxiety about the interruption of education compared to those who had less anxiety (p<0.001) (Table 3).

PTSD scores were significantly higher among participants with internet access and quota problems (p<0.001 and p=0.007, respectively), those with a bad perception of online learning (p<0.007), and those who were not satisfied with online learning (p=0.001) (Table 4). Both PTSD (p<0.001) and insomnia (p=0.013) were significantly higher in those with a high fear of contagion with COVID-19 among relatives.

PTSD Probabilities According to Selected Demographic Characteristics: A logistic regression model was created with variables, and the results are summarized in Table 5.

Table 3. The association of PTSD and insomnia with sociodemographic characteristics

		IES-R Group						ISI Group					
		<33		≥ 33				Normal		Insomnia			
		n	%	n	%	χ^2	p	n	%	n	%	χ^2	p
Sex	Men	258	47.7	71	39.2	3.91	**0.048**	251	45.6	78	45.6	0.000	0.989
	Women	283	52.3	110	60.8			300	54.4	93	54.4		
Study year	Phase 1	118	21.8	41	22.7	1.35	0.507	114	20.7	45	26.3	2.710	0.258
	Phase 2	203	37.5	75	41.4			213	38.7	65	38.0		
	Phase 3	220	40.7	65	35.9			224	40.7	61	35.7		
Do you have any acquaintances with COVID-19	Yes	80	14.8	48	26.5	12.79	**<0.001**	98	17.8	30	17.5	0.005	0.942
	No	461	85.2	133	73.5			453	82.2	141	82.5		
What is your level of anxiety about your relatives (mother. father. sibling. close relative) being infected with COVID-19?	None	11	2.0	2	1.1	34.46	**<0.001**	9	1.6	4	2.3	6.170	**0.013**
	Little	110	20.3	21	11.6			93	16.9	38	22.2		
	Medium	233	43.1	42	23.2			204	37.0	71	41.5		
	High	187	34.6	116	64.1			245	44.5	58	33.9		
What is your level of anxiety about yourself being infected with COVID 19?	None	0	0.0	0	0.0	1.35	0.716	0	0.0	0	0.0	3.675	0.299
	Little	39	7.2	17	9.4			43	7.8	13	7.6		
	Medium	227	42.0	79	43.6			225	40.8	81	47.4		
	High	174	32.2	53	29.3			174	31.6	53	31.0		
Social media	Yes	387	71.5	149	82.3	8.25	**0.004**	413	75.0	123	71.9	0.624	0.429
	No	154	28.5	32	17.7			138	25.0	48	28.1		
WHO's web site	Yes	100	18.5	37	20.4	0.33	0.561	116	21.1	21	12.3	6.531	**0.011**
	No	441	81.5	144	79.6			435	78.9	150	87.7		
How would you describe your level of knowledge about COVID-19?	Very low	33	6.1	4	2.2	5.73	0.126	34	6.2	3	1.8	11.714	**0.008**
	Medium	188	34.8	61	33.7			200	36.3	49	28.7		
	Sufficient	294	54.3	110	60.8			291	52.8	113	66.1		
	Very good	26	4.8	6	3.3			26	4.7	6	3.5		
What is your level of anxiety about the interruption of your education?	None	44	8.1	7	3.9	42.14	**<0.001**	42	7.6	9	5.3	4.309	0.366
	Low	80	14.8	25	13.8			75	13.6	30	17.5		
	Medium	186	34.4	36	19.9			164	29.8	58	33.9		
	High	142	26.2	44	24.3			148	26.9	38	22.2		
	Very high	89	16.5	69	38.1			122	22.1	36	21.1		

Table 4. Relationships of PTSD and insomnia with views on online learning

		IES-R Group						ISI Group					
		<33		≥ 33				Normal		Insomnia			
		n	%	n	%	χ^2	p	n	%	n	%	χ^2	p
What are your thoughts about OL ?	Bad	184	34.0	93	51.4	17.34	**<0.001**	220	39.9	57	33.3	9.398	**0.009**
	Medium	223	41.2	56	30.9			219	39.7	60	35.1		
	Good	134	24.8	32	17.7			112	20.3	54	31.6		
Does your internet have a limited quota	Yes	168	31.1	76	42.0	7.24	**0.007**	182	33.0	62	36.3	0.607	0.436
	No	373	68.9	105	58.0			369	67.0	109	63.7		
I prefer OL to face-to-face lessons.	I agree	186	34.4	61	33.7	0.02	0.868	177	32.1	70	40.9	4.503	**0.034**
	I disagree	355	65.6	120	66.3			374	67.9	101	59.1		
I am satisfied with OL.	I agree	341	63.0	89	49.2	10.81	**0.001**	327	59.3	103	60.2	0.043	0.836
	I disagree	200	37.0	92	50.8			224	40.7	68	39.8		
I believe OL will be improved gradually.	I agree	411	76.0	120	66.3	6.52	**0.011**	409	74.2	122	71.3	0.558	0.455
	I disagree	130	24.0	61	33.7			142	25.8	49	28.7		
OL must be interactive.	I agree	307	56.7	104	57.5	0.02	0.867	324	58.8	87	50.9	3.343	0.068
	I disagree	234	43.3	77	42.5			227	41.2	84	49.1		
After the pandemic, some of the courses should continue as OL.	I agree	263	48.6	85	47.0	0.14	0.700	254	46.1	94	55.0	4.115	**0.043**
	I disagree	278	51.4	96	53.0			297	53.9	77	45.0		
I'm happy with the learning environment in OL.	I agree	308	56.9	75	41.4	13.07	**<0.001**	287	52.1	96	56.1	0.861	0.354
	I disagree	233	43.1	106	58.6			264	47.9	75	43.9		
I prefer the educational environment in my school to OL.	I agree	422	78.0	129	71.3	3.402	0.065	433	78.6	118	69.0	6.624	**0.010**
	I disagree	119	22.0	52	28.7			118	21.4	53	31.0		
I have internet access problems during OL.	I agree	215	39.7	101	55.8	14.213	**<0.001**	251	45.6	65	38.0	3.016	0.082
	I disagree	326	60.3	80	44.2			300	54.4	106	62.0		
I think my education will be incomplete due to OL.	I agree	441	81.5	158	87.3	3.203	0.074	478	86.8	121	70.8	23.611	**<0.001**
	I disagree	100	18.5	23	12.7			73	13.2	50	29.2		

OL Online learning

Table 5. Multivariate analysis of the effects of variables on PTSD

	B	SE	p	OR	95% CI for EXP(B)	
					Lower	Upper
Sex	0.398	0.192	0.038	1.489	1.023	2.167
Do you have any acquaintances with COVID-19	-0.648	0.221	0.003	0.523	0.339	0.807
What is your level of anxiety about your relatives being infected with COVID-19?	0.640	0.130	<0.001	1.896	1.471	2.445
What is your level of anxiety about the interruption of your education?	0.270	0.084	0.001	1.310	1.111	1.543
I am not satisfied with distance lessons.	0.541	0.191	0.005	1.717	1.180	2.498
I have internet access problems during OL	-0.412	0.185	0.026	0.662	0.461	0.951
Constant	-3.512	0.825	<0.001	0.030		

SE: standard error, CI: confidence interval, OR: odds ratio

The probability of PTSD was higher in those who had more fear of COVID-19 transmission to their relatives than in students who had little or no fear (OR=0.523, 95% CI=0.339-0.807; p=0.003). The probability of PTSD was higher in students who followed the news about COVID-19 from social media than those who followed it from other sources (OR=1.489, 95% CI=1.02-2.16; p=0.038). The probability of PTSD in students who are dissatisfied with online learning is higher than that of those who are satisfied (OR=1.717.95% CI=1.180-2.498; p=0.001), and the probability of PTSD in students who had internet problems in online learning was higher than the probability of PTSD in those who did not (OR=0.662, 95% CI=0.461-0.951; p<0.001). The probability of PTSD was higher in students who were worried that their education would be incomplete than those who were not worried (OR=1.310, 95% CI=1.111-1.543; p=0.001).

DISCUSSION

In this study it is found that the medical students were seriously affected psychologically by the COVID-19 pandemic; one out of four students had PTSD and or insomnia.

In a study conducted in Italy at the peak of the epidemic, PTSD was found in nearly half of the healthcare workers and 29.5% of the general population, while insomnia was seen in 8% of the healthcare workers (24, 25). In a multicenter study conducted with healthcare professionals in China, the prevalence of PTSD was 9.1% (26), which was 16.3% in university students (27). Looking at these studies, the PTSD rate in the study in China is lower than our study, and it is much higher in Italy. The frequency of insomnia reported in both studies is much lower than our results. Factors such as the stage of the epidemic, the study group, sociocultural differences, and the number of cases may have been effective in these differences.

We found a higher probability of PTSD in women. The findings in the literature on this issue are contradictory. A study conducted in Italy reported higher rates in women (28), while a study conducted in China found higher rates in men (29). Sociocultural and regional characteristics may have been effective in these differences.

In current study, we found insomnia in one-fourth of the students. Insomnia was more common in students who were concerned about the negative impact on education. In a study conducted with healthcare professionals in Wuhan, sleep disorders were found in 38% of the participants, and contact with COVID-19 patients was determined to be a risk factor for sleep disorders (30). In another study, moderate insomnia was found in 61.6% and several insomnia in 26.6% of frontline workers in a pandemic hospital (31). In a multicenter study conducted with healthcare professionals in China, the rate of insomnia was 36.1% (20). The studies mentioned above, which have high rates of insomnia, have been conducted with health professionals working in the hospital and on the front line. In the current study, insomnia rates are lower. This may ultimately be effective if the students are in the preclinical stage and do not participate in on-patient practices.

It was reported that fear of being infected, having an infected relative, and following the relevant news on social media were risk factors for insomnia (32). In the current study, insomnia was more common in students who had a fear of transmitting the disease to their relatives. In addition, insomnia was significantly higher in students who thought that online learning was bad, who preferred the face-to-face education environment to the online learning environment, and who thought that their education would be incomplete due to online learning.

In some studies, it has been reported that insomnia is more common in women (32, 33), but this has not been confirmed in our study.

It is found that about half of the students (49.8%) were concerned about getting themselves infected with COVID-19. In a study conducted with interns, the anxiety of transmitting COVID-19 to students was higher (64.7%) than our finding (33). The fact that the study mentioned above was

conducted at the beginning of the pandemic and that the interns were working face-to-face with the patients may have been effective in the high contagion concerns.

The students' anxiety about the contagion of their relatives was about twice as much as their anxiety of infecting themselves, and PTSD was significantly higher in students who had a high level of contagion anxiety. We did not find any studies investigating the relationship between fear of contracting COVID-19 to relatives and the risk of PTSD. However, the survey by Safa et al. reported that individuals with severe stress about acquiring COVID-19 had higher anxiety and depressive symptoms (34). Another study reported that PTSD is more common in students who had a relative with COVID-19 or lost a relative due to COVID-19 (27). In our study, having a relative infected with COVID-19 was a risk factor for PTSD. Studies have reported similar results (35, 36). These results show that the relatives of the students experience more stress for their health.

With the closure of schools during the pandemic, education moved to online platforms. Students who were at home during this period tended to seek information about the disease from various sources. Studies show that students frequently use social media as a source of information (35, 37, 38). Social media is also a socialization tool for young people. However, there may be false or sensational information, which may spread without being verified for its correctness (39). We found significantly higher PTSD in students who followed COVID-19 news on social media. Studies have reported higher levels of depression and anxiety in individuals who followed COVID-19 news on social media (40, 41). It may be beneficial to provide students with timely, up-to-date information from their teaching institutions and direct them to suitable information sources for self-directed learning (42). The transfer of accurate and up-to-date information to students by educational institutions will allow them to obtain information from the correct and first source, prevent stress caused by obtaining unlimited and fast information, the accuracy of which has not been checked on social media.

Online learning is very valuable because it ensures the continuation of education during the pandemic process. However, although it is extremely effective for theoretical trainings, it is difficult to say that it is equally successful for practical trainings and applications. As a matter of fact, we have seen that all students had severe concerns about the interruption of their practical education. Planning compensation programs for practical training after the pandemic process and informing students about the issue may reduce their concerns.

Six out of ten students were satisfied with OL, and two-thirds believed that OL would gradually be improved. However, the majority of the students preferred the educational environment at their school to online education. In a study conducted in the UK, students also stated that they prefer a face-to-face educational environment (43).

Online learning conducted during the pandemic process has been an experience for students that they have not been used to until that day. Factors such as the fact that educators, like students, are not experienced enough in OL, and practical training cannot be done remotely have caused stress that their education will be incomplete in students.

Nearly half of the students participating in the study had internet connection problems, and one-third had quota problems. When it is considered that most of the education was done online, factors such as internet access problems, connection problems, quota problems, and/or low internet speed cause problems, such as not being able to connect to the courses, image freezing, audio interruptions, as well as causing inequality of opportunity among students and reducing the efficiency of education.

In our study, there was a significant predictive effect of educational anxiety on PTSD and insomnia. PTSD is raised comprehensively in students who are not satisfied with OL and prefer OL environment at school. It was found that students who are dissatisfied with OL, who prefer face-to-face education, who prefer the educational environment at school to OL, who think that education will remain sour, have a high understanding of alertness.

In online learning, an internet connection is required for students to attend classes. Factors such as lack of access to the Internet, quota problem, connection speed directly affect students' course attendance and the decision they will make from the course. For example, a slow binding can cause freezes, interruptions in the image and sound. With the quota exam, students may not be able to attend the course. Our study results show that the understanding of PTSD is significantly higher in students with internet access and quota problems. In addition, the logistic regression analysis shows that the probability of PTSD is higher in students with internet connection problems. In order to avoid these questions, improving the infrastructure of internet connection, increasing internet speed, solving quota problems, applying importance such as free or affordable internet service to students can reduce educational concerns.

This study was carried out in the second wave of the epidemic in Turkey. Online learning of medical students reflects their views on the state of PTSD and insomnia. Students are experiencing the psychological effects of the pandemic, sleeping at a high rate, and showing signs of PTSD. Students are shifting to the seriousness that their education will remain sour. Strategies should be developed to

support students and increase their endurance. Online information, counseling and intervention activities can contribute to their mental well-being.

In this process, it is very important to ensure that students get the right information and correct their incorrect information. It is recommended to provide social support, check the correctness of information sources and provide easily accessible psychological support.

Limitations: The study has some limitations. First of all, this is a cross-sectional study. It was conducted with preclinical students of a single medical faculty. Therefore, the results cannot be generalized to all medical students. Second, the data are based on students' self-evaluations. The participants' memory is involved in the answers, and it is not possible to avoid prejudice. Finally, as the study was conducted with an online questionnaire, there is also the possibility of selection bias. The inability to reach students who did not have a device or internet and did not use social media may have impacted the results.

CONCLUSION

This study shows that medical students are experiencing the psychological effects of the pandemic and are seriously concerned that their education is incomplete. One in four students experience PTSD or insomnia. Students are more worried about their relatives getting infected than if they were infected themselves. Medical students are at high risk of PTSD and insomnia.

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