Research Doi: 10.25282/ted.1018802

# Perceived Stress Levels of Medical Students and Methods of Coping with Stress at Online Exam

# Tıp Öğrencilerinin Online Sınavda Algıladıkları Stres Düzeyleri ve Stresle Başa Çıkma Yöntemleri

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**Abstract**

**Aim:** Exams are one of the most important factors that increase the stress level of medical school students. The aim of this study is to investigate the perceived stress levels of preclinical medical school students and their methods of coping with stress before and after the online theoretical exam that will be held for the first time.

**Methods:** The sample of this cross-sectional study is 377 (67,2%), I.-III. grade Medical Faculty students. The questionnaire includes 10 questions about socio-demographic information, and the questions are related to students' thoughts on online exams in medical education and the problems which they experienced in the online practice exam. Moreover, "Perceived Stress Scale" and "Coping Stress Styles Scale" were used to collect data from medical students. The link of the questionnaire prepared through the digital form was sent to all students, and the data were collected in the digital environment. Participants' pre- and post-exam data were matched over their school numbers.

**Results:** It was found that 97.9% of the students experienced stress before the exam, and 99.8% of them experienced the same feelings varying from mild to severe after the exam. Before the exam, the median of the "Perceived Stress Scale" (PSS) score was 30 (min. 5- max.56) and the median of the "Coping Stress Styles Scale" (CSSS) score was 74 (min.43- max.120). It was found that the students used the problem-oriented / effective coping methods. It was observed that there was a significant negative correlation between the "PSS" score and problem-oriented/effective coping methods ($r=-0.447$, $p<0.01$), and a positive correlation between emotional/ineffective coping methods ($r=0.361$, $p<0.01$) and also, 62.1% of the students think that it will be appropriate to conduct the theoretical exams online in medical education. The PSS score was significantly higher for female students, and for those who did not follow distance education regularly, and for those who found online exams suitable in medical education, and for those who said that being able to communicate with the exam coordinator during the exam did not give them confidence. Students reported that they encountered the most system-related technical problems during the online exam.

**Conclusions:** The perceived stress level of medical school students who experienced the summative type online exam for the first time was found to be high before and after the exam. Online exam methods will be a field that is frequently applied and developed in the coming years. For this reason, there is a need for more studies in which the factors that cause stress in medical students during online exams are determined.

**Keywords:**
Medical Students, Online Exam, Online Medical Education, Perceived Stress, Styles of Coping with Stress

**Anahtar sözcükler:**
Tıp Fakültesi Öğrencileri, Çevrimiçi Sınav, Çevrimiçi Tıp Eğitimi, Algılanan Stress, Stresle Başa Çıkma Stilleri

Gönderilme Tarihi
Submitted: 03.11.2021
Kabul Tarihi
Accepted: 31.07.2022

*To cite this article: Öztürk Kaygusuz T. Perceived Stress Levels of Medical Students and Methods of Coping with Stress at Online Exam. World of Medical Education. 2022;21(65): 18-30*

***Özet***

***Amaç:*** *Tıp Fakültesi öğrencilerinde stres düzeyini artıran en önemli nedenlerden birisi de sınavlardır. Bu çalışmada preklinik tıp fakültesi öğrencilerine ilk defa yapılacak olan çevrimiçi teorik sınav öncesi ve sınav sonrası, öğrencilerin algıladıkları stres düzeyini ve stresle başa çıkma yöntemlerini araştırmak amaçlanmıştır.*

***Yöntem:*** *Bu çalışma, kesitsel bir çalışma olup Tıp Fakültesi dönem I-III öğrencileri araştırma kapsamına alınmıştır. Çalışmaya 377 öğrenci (%67,2) katılmıştır. Sosyo-demografik bilgiler, tıp eğitiminde çevrimiçi sınavlara bakış açıları ve çevrimiçi deneme sınavında yaşanan sorunlara yönelik 10 soru, "Algılanan Stres Ölçeği" ve "Stresle Başa Çıkma tarzları Ölçeği" sorularını içeren anket kullanılmıştır. Dijital form üzerinden hazırlanan anketin linki tüm öğrencilere ulaştırılmış, veriler digital ortamda toplanmıştır. Katılımcıların sınav öncesi ve sonrası verileri okul numaraları üzerinden eşleştirilmiştir.*

***Bulgular:*** *Öğrencilerin %97,9'nun sınav öncesi, %99,8'nin sınav sonrası hafiften şiddetliye değişen oranda stres yaşadığı bulundu. Sınav öncesi "Algılanan Stres Ölçeği" (ASÖ) puan median 30 (min. 5- max.56) olarak saptandı. Sınav öncesi Stresle Başa Çıkma tarzları Ölçeği (SBÇTÖ) puan medianı 74 (min.43- max.120) olarak bulundu. Öğrencilerin probleme yönelik / etkili başetme yöntemini daha fazla kullandıkları bulundu. "ASÖ" puanı ile probleme yönelik/etkili başetme yöntemleri arasında anlamlı, negatif bir korelasyon ($r = -0.447$, $p<0.01$), duygusal/ etkisiz başetme yöntemleri arasında pozitif bir korelasyon olduğu görüldü ($r = 0.361$, $p<0.01$). Öğrencilerin %62,1'i tıp eğitiminde teorik sınavların online olarak yapılmasını uygun bulmaktaydı. Kadınlarda, uzaktan eğitimi düzenli olarak takip edenlerde, tıp eğitiminde çevrimiçi teorik sınavları uygun bulanlarda ve sınav sırasında sınav koordinatörü ile iletişim kurabilmenin kendilerine güven vermediğini söyleyenlerde PSS puanı anlamlı olarak daha yüksekti. Öğrenciler, çevrimiçi sınav sırasında en fazla sistemle ilgili teknik sorunla karşılaştıklarını bildirdi.*

***Sonuç:*** *Sürece yönelik değerlendirme için ilk defa çevrimiçi sınav tecrübesi yaşayan tıp fakültesi öğrencilerinin sınav öncesi ve sonrası algıladıkları stres düzeyi yüksek bulundu. Çevrimiçi sınav yöntemleri, önümüzdeki yıllarda sıkça başvurulan ve geliştirilen bir alan olacaktır. Bu nedenle çevrimiçi sınavlar esnasında tıp öğrencilerinde strese neden olan faktörlerin tespit edildiği, çözüm önerilerinin yapıldığı daha fazla çalışmaya ihtiyaç vardır.*

## INTRODUCTION

It has been reported that exams, through which the educational process and academic performance are evaluated, are the most effective stress factor on medical students. In the literature, it has been stated that medical students experience different levels of anxiety against different assessment methods, and those changes in the type of exam may have negative effects on medical students studying for only certain exam types. (1-3).

During the coronavirus 2019 (COVID-19) pandemic, it has become inevitable to continue medical education and exams online (4, 5). In the past years, during the SARS epidemic, how to continue online medical education and student assessments during the pandemic period were experienced. (6). With the introduction of online exams into medical education, situations that will create anxiety for students and educators during the exam have emerged (7,8).

Students have very little experience in online exams at medical faculties, and there is no study in the literature that measures stress levels before and after online exams. Knowing the level of stress that medical students perceive due to the online exam is very important in terms of providing psychological and behavioral support to students (1-3). In addition, determining the factors that may affect the stress level in online exams will contribute to the solution of the problems. This study was carried out during the education period when the

COVID 19 pandemic broke out. No studies have been found in the literature on perceived stress levels related to online exams.

This study was conducted to examine the perceived stress level and methods of coping with stress of the students before and after the theoretical online exam, which was held for the first time in the medical faculty Term I-II-III due to the COVID-19 pandemic.

## METHODS

The population of this cross-sectional study consists of term I-III students studying at Fırat University Faculty of Medicine. Ethical permission (reference no. 2021/02-16) was taken from the Fırat University Ethics Committee of Non-Interventional Studies. It was aimed to reach all of the students without using any sampling method, and 377 (67.2%) of the 561 students were reached and 35.3% of the students were term I, 32.9% were term II, 31.8% were term III. The data were collected through digitally prepared questionnaire. The questionnaire form prepared via the Google form was sent to the WhatsApp groups two-three days before and one day after the summative exam by the class representative, and those who volunteered to participate in the study were asked to fill out the forms in the digital environment. Study data were collected before and after the exam. In particular, students who filled out the pre-exam questionnaire were asked to answer the post-exam questionnaire. Participants' prior and post-exam data were matched with their school numbers.

### *Data Collection Tools*

Survey questions consist of three parts.

***1. Socio-Demographic Questionnaire*:** This part consists of 10 questions designed to learn some descriptive demographic data of students, their opinion about online exams in medical education and the problems which they experienced during the online trial exam. Students were expected to answer about their gender, grade, whether they were able to follow the course of the distance education program regularly, how they would evaluate the online theoretical exams in medical education, how they would evaluate the online feasibility of practice exams in medical education, whether they have any electronic device to take online exams, whether they have preliminary information/trial been made about how you will perform the exam in the system, whether it gave them confidence to know that they could contact the exam center about problems that may occur during the exam, whether they have a problem with the online trial exam before the real exam and what kind of problems they had during the online this trial exam.

***2.Perceived Stress Scale (PSS):*** PSS is an easy and widely used scale with acceptable psychometric properties designed to measure how stressful people perceives certain situations in their life. In this test, Participants are asked to rate the degree of stress they have experienced in the past month. (1,9). PSS was developed by Cohen et al. (10), and the reliability coefficient of the scale was found to be 0.84-0.86. Eskin (11), who conducted the Turkish validity and reliability study of this scale, reported the reliability coefficient of the Turkish version of the scale as 0.84. This scale consists of 14 items and was prepared in a 5-point Likert type (Never = 0, Very often = 4). Seven of the questions (4th, 5th, 6th, 7th, 9th, 10th, 13th questions) with positive expressions were scored in reverse (Never= 4, Very often=0). The total score from PSS indicates the stress level of the person. The PSS-14 has a possible range of scores from 0 to 56. The range of PSS scores divided into stratified quartiles, and the stress score was classified as none (0-13), mild (14-27), moderate (28-41), and severe (42-56) stress. This range value was chosen based on a similar study conducted in Egypt (9). The 10-item questionnaire containing sociodemographic questions was used to identify factors that may be associated with moderate and severe stress levels.

***3.Coping Stress Styles Scale (CSSS):*** CSSS was developed by Folkman and Lazarus (12) as an inventory consisting of 66 items in order to evaluate students' coping techniques with stress. Some researchers have made new adaptations on the original scale by making analysis according to the purpose and sample of their research. (13,14). It was adapted for university students by Şahin and Durak (15) in Turkey, and the scale was converted into a 30-item form by analyze validity and reliability. The total score of the scale which was prepared in the four-point Likert type is minimum 30 and maximum 120. Of the five sub-scales, the self-confident approach (SCA), optimistic approach (OA) and Seeking Social Support (SSS) are evaluated as "Problem oriented/Effective" in terms of coping stress sub-scale of the scale, while helpless approach (HA) and submissive approach (SA) sub-scales were evaluated as "Emotional/Ineffective" style in coping with stress; furthermore, 8th, 10th, 14th, 16th, 20th, 23rd and 26th questions of the scale are under SCA sub-scale (min-max. score = 7-28); 2nd, 4th, 6th,12th, and 18th questions are under OA sub-scale (min-max. score=5-20); 1st, 9th ,29th and 30th questions are under SSS. sub-scale (min-max. score=4-16); 3rd, 7th, 11th.,19th.,22nd.,25th.,27th. And 28th questions are under HA (min-max. score=8-32); 5th, 13th, 15th, 17th, 21st and 24th questions are under SA sub-scales (min-max. score=6-24). Higher scores indicate that the person uses that style more.

IBM SPSS Statistics Version 22.0 was used for all analysis (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Cor). Kolmogorov-Smirnov Test was used to determine the normality of the quantitative data. No normal distribution was observed in the data. Categorical variables were calculated as frequency and percentage, and continuous variables were calculated as median and minimum-maximum. For non-normally distributed data, the Mann-Whitney U test was used to compare continuous variables between two independent groups, and the Kruskal Wallis test was used to compare more than two groups. For comparison of two related (paired) continuous variables, Wilcoxon Signed Rank test was used. Friedman test was used to compare means between more than two matched or dependent groups. Spearman correlation analysis was used to compare the two metric data. In order to determine the factors affecting medium and high stress levels, firstly, the chi-square test was used for intergroup comparisons with categorical data. Significant factors predicting stress on univariate analysis were entered into multivariate logistic regression analysis. The outcome variable was the presence of a moderate and severe level of stress as measured by the perceived stress scale. Significance was evaluated at the $p<0.05$ level.

**RESULTS**

This study was conducted among preclinical students. Moreover, 55.4% of the students included in the study were women and 47.2% of the participants stated that they regularly follow the courses of the distance education program, 62.1% stated that it is appropriate to conduct the theoretical exams online in medical education (Table1). In the study, the pre-exam PSS score was found to be significantly higher in girls. There was no significant difference in terms of gender after the exam ($p=0.006$). It was observed that students who did not regularly follow the courses of the distance education program had higher PSS scores before the exam ($P<0.001$). The PSS score was higher for those who found it appropriate to conduct the theoretical exams online in medical education ($p=0.013$). The PSS score of the students who stated that knowing that they could communicate with the exam coordinator about the problems that may occur during the exam gave them confidence was significantly lower ($p=0.003$). The PSS score of the students who had problems with the online test before the real test was significantly higher ($p<0.001$). The

difference in post-exam PSS scores in these variables was not significant (Table1).

**Table 1.** Comparison of Perceived Stress Scores Before and After the Exam according to Some Variables

| | | | Pre-exam | Post-exam |
|---|---|---|---|---|
| | **N** | **%** | **Median (Min-Max)** | **Median (Min-Max)** |
| **Gender** | | | | |
| Male | 168 | 44.6 | 28 (8-56) | 29 (16-56) |
| Female | 209 | 55.4 | 31 (5-54) | 29 (2-56) |
| | | | p=0.006* | p=0.515* |
| **Term** | | | | |
| 1 | 133 | 35.3 | 30 (5-54) | 29 (2-56) |
| 2 | 124 | 32.9 | 30 (8-56) | 30 (16-56) |
| 3 | 120 | 31.8 | 31.5 (12-56) | 28.5 (15-47) |
| | | | p=0.082** | p=0.378** |
| **Following the courses of the distance education program regularly** | | | | |
| Yes | 178 | 47.2 | 29 (5-56) | 29 (15-56) |
| No | 43 | 11.4 | 33 (14-56) | 31 ( 2-56) |
| Partly | 156 | 41.4 | 31 (9-52) | 29 (14-52) |
| | | | p<0.001** | p=0.157** |
| **Evaluation of online theoretical exams in medical education** | | | | |
| Suitable | 234 | 62.1 | 32 (15-56) | 30 (15-56) |
| Not Suitable | 58 | 15.4 | 30 (10-50) | 31 (19-56) |
| Indecisive | 85 | 22.5 | 30 (5-56) | 28.5 (2-56) |
| | | | p=0.013** | p=0.084** |
| **Evaluation of the online feasibility of practice exams in medical education** | | | | |
| Suitable | 117 | 31.0 | 31 (9-56) | 30 (14-56) |
| Not Suitable | 167 | 44.3 | 30 (16-47) | 31 (2-56) |
| Indecisive | 93 | 24.7 | 28 (5-56) | 28 (16-56) |
| | | | p=0.224** | p=0.052** |
| **Possession of any electronic devices to take online exams.** | | | | |
| Yes | 368 | 97.6 | 30 (5-56) | 29.5 (2-56) |
| No | 9 | 2.4 | 30 (24-45) | 26 (21-37) |
| | | | p=0.838* | p=0.271* |
| **Knowing that you can communicate with the exam coordinator about the problems that may occur during the exam gives you confidence.** | | | | |
| Yes | 334 | 88.6 | 30 (5-56) | 29 (14-56) |
| No | 43 | 11.4 | 34 (17-56) | 30 (2-43) |
| | | | p=0.003* | p=1.790* |

| | N | % | Pre-exam Median (Min-Max) | Post-exam Median (Min-Max) |
|---|---|---|---|---|
| **Having a problem during the trial online exam before real exam** | | | | |
| Yes | 159 | 42.2 | 32 (10-56) | 30 (2-56) |
| No | 218 | 57.8 | 29 (5-56) | 29 (14-53) |
| | | | p<0.001* | p=0.415* |

*Mann-Whitney test **Kruskal-Wallis test

It was determined that 32.4% (n=122) of the students experienced mild stress, 59.4% (n=224) moderate stress, and 6.1% (n=23) high-level stress before the exam (Figure 1).

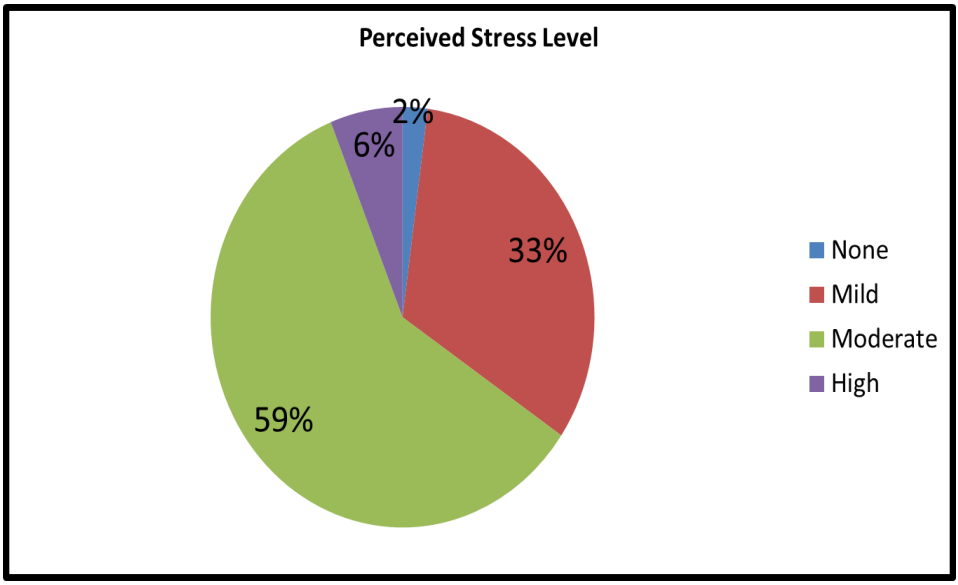


**Figure 1.** Perceived Stress Level Online Pre-Exam

Students (%42.2) who stated that they had problems during the online practice exam reported that they encountered mostly system-related technical problems (Figure 2).

The median PSS score before the exam was 30 (min.5- max.56). The median CSSS score before the exam was 74 (min.43- max.120). The problem-oriented Coping Stress Styles (CSS) score of the students 91.5% (n=345) was higher than the emotional CSS score. In terms of coping styles with stress, it was found that students use the problem-oriented/effective method more than the emotional method before the exam (<0,001) (Table 2).

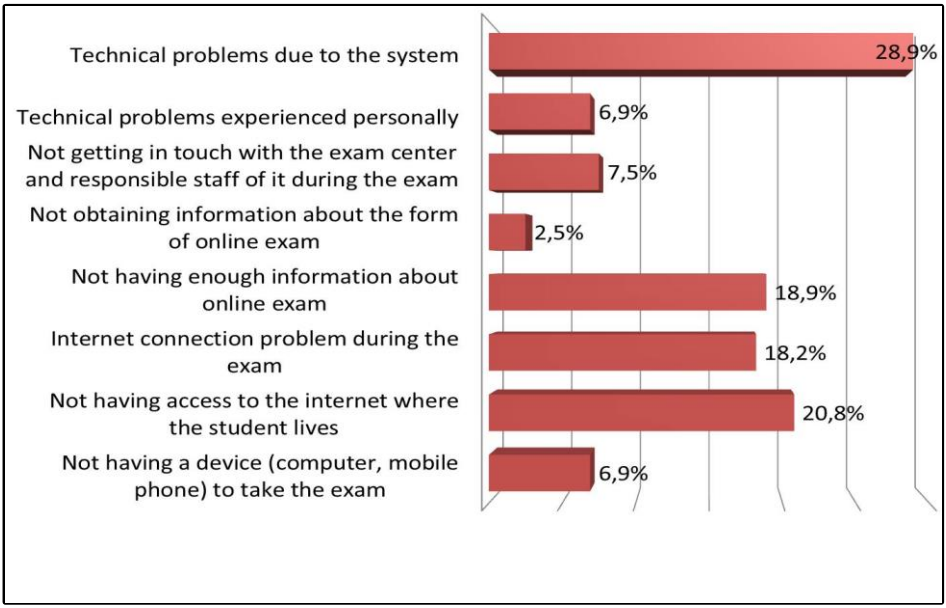


**Figure 2.** Problems Encountered During the Online Trial, n=159 (%42,2)

**Table 2.** Participants' Pre-exam Perceived Stress Scale and Coping Stress Style Median Scores

| | **Pre-exam** | |
|---|---|---|
| | **Median (min-max)** | **p** |
| **PSS** | 30 (5-56) | |
| **CSSS** | 74 (43-120) | |
| **Problem oriented/effective coping method** | 44 (21-64) | <0,001[Ω] |
| **Emotional / ineffective coping method** | 30 (15-56) | |

PSS= Perceived Stress Scale, CSSS= Coping Stress Styles Scale

[Ω] Wilcoxon signed ranks test

All those with a high CSS score had high SCA score for the problem; all those with a high CSS score for emotions had a higher HA score (Table 3). It was observed that there was a significant negative correlation (r =-0.45, p<0.01) between the PSS mean score and problem-oriented/effective coping methods, and a significant positive correlation between emotional/ineffective coping with stress methods (r=0.36, p<0.01).

In the study, it was found that pre-exam PSS Cronbach was α=0.91, CSSS before the exam Cronbach was α=0.78.

Multivariate logistic regression analysis determined that the independent predictors of moderate and severe stress level in the total sample were gender, following the courses of the distance education program regularly, and having a problem during the trial online exam before real exam. It was observed that being a woman increased having a moderate and severestress level (Odds Ratio (OR):2.15; 95%Confidence Interval (95%CI):1.4-3.4) times compared to being a man. It was found that those who do not regularly follow the distance education program are (OR:2.69;

95%CI:1.2-6.2) times more likely to have moderate and severe stress levels than those who do. It was observed that the probability of having moderate and severe stress levels increased (OR:1.94; 95%CI:1.2-3.1) times for those who had problems in the practice exam before the real exam (Table4).

**Table 3.** Pre-exam Score Distribution of Problem and Emotion-Oriented Coping Stress Styles (CSS) Subscales

| | | Pre-exam Median (Min-Max) | p |
|---|---|---|---|
| **Problem oriented* CSS subscales** | **SCAS** | 20 (7-28) | <0.001¥ |
| | **OAS** | 13 (5-20) | |
| | **SSS** | 11 (5-16) | |
| **Emotional CSS subscales** | **HAS** | 18 (8-32) | <0.001Ω |
| | **SAS** | 12 (6-24) | |

¥ Friedman Test; Ω Wilcoxon signed ranks test

CSS= Coping Stress Styles, SCAS =self-confident approach scale, OAS= optimistic approach scale, SSS=Seeking Social Support scale, HAS=hopeless approach scale, SAS=submissive approach scale

**Table4.** Multivariate Logistic Regression Analysis of Significant Predictors of Moderate and Severe Stress

| | $\widehat{\beta}$ | p | Odds Ratio (OR) 95%ConfidenceInterval (95%CI) |
|---|---|---|---|
| **Predictor** | | | |
| **Gender** | | | |
| Male | - | - | 1(r=Referance group) |
| Female | 0.767 | 0.001 | 2.15(1.4-3.4) |
| **Following the courses of the distance education program regularly** | | | |
| Yes | - | | 1(r) |
| No | 0.990 | 0.020 | 2.69(1.2-6.2) |
| Partly | 0.545 | 0.023 | 1.73(1.1-2.8) |
| **Having a problem during the trial online exam before real exam** | | | |
| No | - | | 1(r) |
| Yes | 0.661 | 0.006 | 1.94(1.2-3.1) |

## DISCUSSION

Today, due to the COVID-19 pandemic, academical difficulties have been experienced in general, and online education and exams in medical faculties have become quite common as an academic norm (16). However, it is expected that medical students trying to adapt to these new learning and assessment methods are stressed.

In this study, students were asked to answer the questionnaire questions according to their feelings and thoughts for the last month. It was seen that 32.4% of them felt mildly stressed before the exam, 59.4% of them moderately, 6.1% of them felt high level stress. In the literature review conducted by Fares et al. (17) covering the years 1988-2015, it was reported that the stress level in preclinical medical students was between 20.9% and 90%, and the rates varied according to the countries. Amr et al. reported that the mild/moderate stress rate was 76.2%, the high-level stress rate was 23.8% in female medical students, and the mild/moderate stress rate was 82.9% and the

high-level stress rate was 17.1% in male students (9).

In the study of Sarkar et al. (18), 55.1% of medical school students regard medical education as extremely stressful, and the most common recommendation to reduce the stress of medical education was to conduct exams less frequently. In the study of Silva (2) et al., it was reported that the physical and psychological stress of medical school students increased during the exam. Fond (19), in his study involving 1st and 2nd term medical school students; reported that 8.5% of the students used psychoactive drugs before the exam due to stress. Aktekin et al. (20) While the stress rate of preclinical medical faculty students from Turkey was 47.9%, Konar (21) stated that the post-exam stress level of medical students increased. In our study, it was thought that the high level of stress in students might be due to the form of the summative online exam which they will experience for the first time and the uncertainty in the assessment processes.

In this study, the stress level of female students before the exam was found to be higher. Female students were more than twice as likely to have moderate to severe stress levels. It is thought that the online exam, which will be held for the first time, may have increased the stress level in female students. It is reported in the literature that female medical students are generally more stressed (1,22,9). Similarly, in a study by Tunç et al. (23) in Turkey, female medical students were reported to be more stressed. The fact that female students are more stressed is related to being more competitive, experiencing the fear of failure more, and caring more about their performance.

In this study, no difference was found between the stress scores of term I-III students It is an expected result that the stress level experienced before the online exam, which will be held for the first time, is experienced at the same level in all classes. In some studies, it was reported that medical students experienced more stress in the first years of their education and their stress decreased in the following education periods (24), while in others it was reported that psychological distress was most common in the 3rd term (25). In the study of Tunç et al. (23), it was stated that term III students were more stressed than term I-II students.

In the study, it was determined that the stress score of the students who regularly followed the distance education courses before the exam was lower.It was found that the moderate and severe stress levels of those who do not regularly follow the distance education program are 2.5 times higher than those who do. This result is due to the fact that the students who study regularly, complete their subject integrity by spreading over time and feel more ready for the exams because they had enough time to prepare for the exams. The fact that the stress levels of the students who work regularly, even in an exam method to be held for the first time, are lower, was found valuable in terms of showing the importance of regular study. Some studies investigating the stress-causing factors in medical students support our results. It has been reported that lack of time to review the subject, intense study in a short time, and poor academic performance cause stress (26,27).

Although they did not have previous experience, most of the students think that online exams in medical education are suitable for theoretical exams but not for practical exams measuring skills. The online exam was held for the first time in our faculty. For this reason, in order to see the functionality of the online exam system and to identify the problems, a trial exam was conducted with all students before the real exam. The stress levels of the students who thought it appropriate to conduct the theoretical exams online in medical education and who stated that knowing that they could communicate with the exam center / coordinator about the problems that may occur during the exam would give them confidence were found to have lower stress level, and the stress levels of the students who had a problem during the

online trial exam before the real exam were found to have higher stress level. In recent years, with the introduction of online exams into medical education, the advantages and disadvantages have been investigated; It has been reported that problems such as the absence of a device to take the exam, the device not having the appropriate technology, internet connection problems (speed, inability to connect, disconnections), the environment during the exam, exam security, lack of computer technology are the factors that cause stress for the student and the trainer during the exam (7,8). Similarly, in our study, students reported system-related technical problems, not being able to access the internet, disconnecting from the internet, not having enough information about the online exam, not being able to communicate with the exam coordinator during the exam as the most common problems they experienced during the trial online test application.

The fact that stress is higher in medical students compared to other faculties has revealed the importance of ways to cope with stress. (17,22). Van der Merwe et al. (22) reported that knowing the coping strategies that medical students use in the face of various stresses they may encounter during their education is important for their search for solutions. In the literature, it has been stated that strategies including effective methods such as problem solving, positive reinterpretation and expressing emotion facilitate student adaptation (17),

and students who use methods such as avoidance, negative and passive approaches experience more psychological problems such as exhaustion, depression and stress (28).

Furthermore, it was found that the students mostly used 'problem-oriented/effective coping methods' among the methods of coping with stress, while those with high PSS scores used 'emotional/ineffective coping methods' more. It was observed that they mostly used the 'self-confident approach' compared to other the problem-oriented/effective methods, and the 'helpless approach' method was the mostly used among the emotional/ineffective coping methods. Similar to our findings in the literature, it has been reported that medical students mostly use active, positive and effective methods of coping with stress, which is one of the methods used to improve the situation an individual finds himself or herself in (22,24). In the study of Thompson et al. (25) divided methods of coping with stress into two as 'approach-oriented' and 'avoidance-oriented', and it was reported that mental distress was less common in students who used ‘approach-oriented’ coping methods and more in students with lack of social support. They suggested coping methods such as exercising more, communicating with a therapist or counselor, talking or spending more time with friends, getting support from a religious or spiritual counselor, talking or spending more time with family members due to their positive contribution to health. Erschens et al. (29) stated that medical students mostly used functional-behavioral coping strategies, but approximately 50 percent of the students chose the 'withdrawal-avoidant approach' when under stress and fatigue. In the same study, they recommended medical students to get social support (friends, family members and other students), relaxing exercises and sports to alleviate the effects of stress and fatigue. In a study conducted by Konar (21) from Turkey on medical students, it was reported that term VI students used the most "Seeking Social Support" method and the least "Submissive Approach".

***Strengths and Weaknesses of The Study***

One of the strengths of this study is that it provides a cross-sectional view of a medical education program in which all three preclinical students participated. It not only focuses on stress and coping strategies, but also identifies some association with these data. One of the other strengths of this study is the use of high-

reliability measurement tools validated by the findings obtained from different populations.

The study also has some limitations. The first one is that, due to the nature of the cross-sectional study, more studies that can be correlated should be conducted in order to generalize the results to all medical school students. Secondly, it is possible that the perceptions of students who are not in the school environment during the pandemic period regarding the process of conducting and evaluating the summative online exams that they will meet for the first time may have increased their stress levels. Thirdly, the scales used in this study are frequently used to measure the stress perception and coping methods of medical students. However, no study has been found on the online application of these scales.

Another limitation, the transition to the online exam for the first time due to the pandemic was made as an emergency action plan in order not to interrupt medical education. For this reason, the fact that the PSS scores of the students in the face-to-face exams are not known is a limitation of the study.

## CONCLUSIONS

In this study, it was found that most of the medical school students were highly stressed before the summative online exam, which was conducted for the first time, and this stress continued after the exam. Getting medical students, who have gone through a difficult education process, exposed to unusual examination processes may cause students increase their stress level.

With the COVID-19 pandemic, online exam methods, which are seen to be feasible in medical education, will be a potential education field that will be frequently applied coming years. However, further studies are needed to determine the factors that cause stress in medical students during online exams, and solutions that will reduce the student's strees level should be put forward.

## REFERENCES


1. Shah M, Hasan S, Malik S, Sreeramareddy CT. Perceived stress, sources and severity of stress among medical undergraduates in a Pakistani medical school. BMC Med Educ. 2010 Jan 15; 10:2. doi: 10.1186/1472-6920-10-2.

2. Silva E, Aguiar J, Reis LP, Sá JOE, Gonçalves J, Carvalho V. Stress among Portuguese medical students: the eustress solution. J Med Syst. 2020 Jan 2;44(2):45. doi: 10.1007/s10916-019-1520-1.

3. Preston R, Gratani M, Owens K, Roche P, Zimanyi M, Malau-Aduli B. Exploring the impact of assessment on medical students' learning. Assessment & Evaluation in Higher Education, 2020; 45(1): 109-124. doi: 10.1080/02602938.2019.1614145

4. Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. Lancet Infect Dis. 2020 Jul;20(7):777-778. doi: 10.1016/S1473-3099(20)30226-7

5. Rajab MH, Gazal AM, Alkattan K. Challenges to online medical education during the COVID-19 pandemic. Cureus. 2020 Jul 2;12(7): e8966. doi: 10.7759/cureus.8966.

6. Elzainy A, El Sadik A, Al Abdulmonem W. Experience of e-learning and online assessment during the COVID-19 pandemic at the College of Medicine, Qassim University. J Taibah Univ Med Sci. 2020 Dec;15(6):456-462. doi: 10.1016/j.jtumed.2020.09.005.

7. Dennick R, Wilkinson S, Purcell N. Online eAssessment: AMEE guide no. 39. Med Teach. 2009;31: 3: 192-206, doi: 10.1080/01421590902792406.

8. Ellaway R, Masters K. AMEE Guide 32: e-learning in medical education part 1: learning,

teaching and assessment. Med Teach.(2008). 30(5), 455-473. doi: 10.1080/01421590802108331.

9. Amr M, Hady El Gilany A, El-Hawary A. Does gender predict medical students' stress in mansoura, Egypt? Med Educ Online. 2008 Aug 14; 13:12. doi: 10.3885/meo.2008.Res00273.

10. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983 Dec;24(4):385-96.

11. Eskin M, Harlak H, Demirkıran F, Dereboy Ç. The adaptation of the perceived stress scale into Turkish: a reliability and validity analysis. In New Symposium Journal. 2013; 51(3): 132-140.

12. Folkman S, Lazarus RS. Coping as a mediator of emotion. J Person Soc Psychol 1988; 54: 466-75.

13. Amirkhan JH. A factor analytically derived measure of coping: the coping strategy indicator. J. Pers. Soc. Psychol. 1990;59(5); 1066-74. https://doi.org/10.1016/S0191-8869(97)00012-3

14. Oakland S, Ostell A. Measuring coping: a review and critique. Human Relations. 1996;49(2):133-155.doi:10.1177/001872679604900201

15. Şahin NH. Durak A. Stress coping styles scale: adaptation for university students. Türk Psikoloji Dergisi. 1995;10(34):56-73.

16. Gordon M, Patricio M, Horne L, Muston A, Alston SR, Pammi M et all. Developments in medical education in response to the COVID-19 pandemic: A rapid BEME systematic review: BEME Guide No. 63. Med Teach. 2020 Nov;42(11):1202-1215. doi: 10.1080/0142159X.2020.1807484.

17. Fares J, Al Tabosh H, Saadeddin Z, El Mouhayyar C, Aridi H. Stress, burnout and coping strategies in preclinical medical students. N Am J Med Sci. 2016 Feb;8(2):75-81. doi: 10.4103/1947-2714.177299.

18. Sarkar S, Menon V, Kumar S. Reducing stress among medical students: A qualitative study of students' perspectives. IndianJPsychiatry. 2020 Mar-Apr;62(2):198-201. doi: 10.4103/psychiatry.IndianJPsychiatry_354_19.

19. Fond G, Bourbon A, Boucekine M, Messiaen M, Barrow V, Auquier P et all. First-year French medical students consume antidepressants and anxiolytics while second-years consume non-medical drugs. J Affect Disord. 2020 Mar 15;265:71-76. doi: 10.1016/j.jad.2020.01.035.

20. Aktekin M, Karaman T, Senol YY, Erdem S, Erengin H, Akaydin M. Anxiety, depression and stressful life events among medical students: A prospective study in Antalya, Turkey. Med Educ. 2005; 35:12–7. doi: 10.1046/j.1365-2923.2001.00726.x.

21. Konar NM. Factors associated with depression, anxiety and stress levels among medical students. Ankara Medical Journal. 2020; 20(1): 90-104. Doi: 10.5505/amj.2020.35761.

22. Van der Merwe LJ, Botha A, Joubert G. Resilience and coping strategies of undergraduate medical students at the University of the Free State. S Afr J Psychiatr. 2020; Jul 28; 26:1471. doi: 10.4102/sajpsychiatry.v26i0.1471. PMID: 32832128; PMCID: PMC7433285.

23. Tunç AY, Yapıcı G. Evaluation of students' depression, anxiety and stress levels in a medical faculty. TurkJPH. 2019; 17(2): 153-168. https://doi.org/10.20518/tjph.423636

24. Heinen I, Bullinger M, Kocalevent RD. Perceived stress in first year medical students-associations with personal resources and emotional distress. BMC Med Educ. 2017 Jan 6;17(1):4. doi: 10.1186/s12909-016-0841-8.

25. Thompson G, McBride RB, Hosford CC, Halaas G. Resilience among medical students: the role of coping style and social support. Teach Learn Med. 2016;28(2):174-82. doi: 10.1080/10401334.2016.1146611.

26. Dyrbye LN, Harper W, Durning SJ, Moutier C, Thomas MR, Massie FS Jr et all. Patterns of distress in US medical students. Med Teach. 2011;33(10):834-9. doi: 10.3109/0142159X.2010.531158.

27. Portoghese I, Porru F, Galletta M, Campagna M, Burdorf, A. Stress among medical students: factor structure of the university stress scale among Italian students. BMJ open, (2020); 10(9): e035255. https://doi.org/10.1007/s12144-020-00922-x

28. Fares J, Saadeddin Z, Al Tabosh H, Aridi H, El Mouhayyar C, Koleilat MK et all. Extracurricular activities associated with stress and burnout in preclinical medical students. J Epidemiol Glob Health. 2016 Sep;6(3):177-85. doi: 10.1016/j.jegh.2015.10.003.

29. Erschens R, Loda T, Herrmann-Werner A, Keifenheim KE, Stuber F, Nikendei C et all. Behaviour-based functional and dysfunctional strategies of medical students to cope with burnout. Med Educ Online. 2018 Dec;23(1):1535738. doi: 10.1080/10872981.