

THE EFFECT OF STRESS DURING ONLINE LEARNING ON MEDICAL STUDENT'S LEARNING ACHIEVEMENT IN COVID-19 PANDEMIC

Putu Nandika Tungga Yudanti Mahardani¹, Sri Darmayani², Dyah Kanya Wati^{3*},
Maria Elisabeth Sylvinna Wasi Elannor¹, Ketut Wulan Ari Kartika Ardhaputri¹, Andreliano Yosua Rompis¹

¹Undergraduate Student, Faculty of Medicine, Udayana University, Denpasar – INDONESIA

²Department of Medical and Health Education, Faculty of Medicine, Udayana University, Denpasar – INDONESIA

³Department of Child Health, Udayana University, Denpasar – INDONESIA

Submitted: 15 Nov 2020; Final revisions from authors: 10 May 2021; Accepted: 22 Jun 2021

ABSTRACT

Background: Medical students are a population that is considered vulnerable to experience stress during the COVID-19 pandemic, especially with the heavy learning load and changes in the learning system that were initially carried out face-to-face. Currently, there are limited data regarding the stress of studying online in medical students and their effect on learning achievement. This study aimed to determine the stress effect of studying online in medical students on their academic achievement.

Methods: This study was an analytic observational study with a cross-sectional approach. 112 samples were obtained from students of Bachelor of Medicine and Medical Doctor in one of the universities in Bali with the instruments that were distributed via Google Form. Primary data collection was carried out using the Medical Student Stressor Questionnaire (MSSQ) questionnaire, while secondary data collection was obtained from the average score of three-block exams done online during the COVID-19 pandemic.

Results: The stress level of medical students in online learning was dominated by high stress (55.4%) with the majority cause due to Academic Related Stressor (ARS). There is a significant relationship ($p = 0.021$) between the incidence of stress and learning achievement in students (-0.217 , 95% CI -0.39 to -0.03). The learning system preference that was chosen by the students is dominated by a 50% online learning system and 50% offline as much as 27.7%.

Conclusion: The results indicated that there is a high level of stress among medical students. There is a correlation between stress events and medical student's achievement during online learning.

Keywords: stress, COVID-19, learning achievement, online learning, medical students

ABSTRAK

Latar belakang: Indonesia merupakan negara yang menganut sistem belajar online akibat situasi pandemi COVID-19. Mahasiswa kedokteran adalah populasi yang dianggap rentan mengalami stress selama pandemi berlangsung, terlebih dengan beban pembelajaran yang berat dan perubahan dalam sistem pembelajaran yang pada awalnya dilakukan tatap muka. Saat ini, data mengenai stres belajar online pada mahasiswa kedokteran dan efeknya terhadap prestasi belajar masih terbatas. Penelitian ini bertujuan untuk mengetahui efek stres belajar online pada mahasiswa kedokteran terhadap prestasi belajar.

*corresponding author, contact: dyahkanyawati@unud.ac.id

Metode: Penelitian ini merupakan penelitian observasional analitik dengan pendekatan cross sectional. Diperoleh 112 sampel dari mahasiswa angkatan 2018 dan 2019 jurusan Program Studi Sarjana Kedokteran dan Profesi Dokter (PSSKPD) Fakultas Kedokteran pada salah satu universitas di Bali dengan instrumen yang disebarakan melalui Google Form. Pengumpulan data primer dilakukan dengan menggunakan kuisioner Medical Student Stressor Questionnaire (MSSQ), sedangkan pengumpulan data sekunder dilakukan melalui nilai rata-rata hasil tiga ujian blok yang pembelajarannya dilakukan secara online selama pandemi COVID-19.

Hasil: Mahasiswa kedokteran yang mengalami stres berat akibat pembelajaran online sebesar 55,4% dengan penyebab terbesar akibat ARS (Academic Related Stressor). Terdapat hubungan yang signifikan ($p=0,021$) antara kejadian stress dengan prestasi belajar pada mahasiswa dengan korelasi negatif dan kekuatan korelasi yang rendah (-0,217, 95% CI -0,39 hingga -0,03). Preferensi sistem pembelajaran yang dipilih mahasiswa didominasi oleh sistem belajar 50% online dan 50% offline sebanyak 27,7%.

Kesimpulan: Gembatan stres belajar online pada mahasiswa kedokteran didominasi oleh stres berat akibat beban akademik. Terdapat hubungan antara kejadian stress dengan prestasi belajar mahasiswa kedokteran selama pembelajaran online, namun kekuatan korelasinya rendah.

Kata kunci: stres, COVID-19, prestasi belajar, pembelajaran online, mahasiswa kedokteran

PRACTICE POINTS

- The stress level of medical students in online learning in the COVID-19 era is dominated by high stress, while most of the medical student's achievement was satisfying.
- The cause of stress for medical students is dominated by ARS (Academic Related Stressor) or stress due to academic load, while the lowest cause of stress is DRS (Drive & Desire Related Stressor) or stress due to an internal willingness to study medical science.
- There is a relationship between stress events during the online learning system and their achievement with low correlation strength.
- The online learning system can encourage the more optimal learning system by utilizing digitalization instead of fully conventional face-to-face learning, as evidenced by the learning system preferences of medical students are dominated in an online learning system that was combined in half with offline.

INTRODUCTION

Indonesia is one of the countries that adopt an online learning system due to the COVID-19 pandemic situation which has begun to spread since the end of 2019.¹ In order to inhibit the transmission rate of infection, the Ministry of Education and Culture (Kemendikbud) has begun to establish an online learning mechanism by stopping all of the learning activities in face to face and begin to develop portal-based and android learning application.² Massive changes in this learning system can certainly have a

big impact on the learning process, have the potential to cause stress for students who are not ready for change.

Stress is a form of body response that is not specific, so it can not only feel emotions such as fear and panic but can manifest physically as headaches and muscle tension in body parts.³ Stress does not occur naturally but is triggered by real and imaginary threats.⁴ Based on data from the American Psychological Association, the prevalence of stress in Americans in 2015 reached 65%.⁵ The incidence of stress that

occurs in Indonesia is still unknown in general. Stress events are related to other mental health problems such as depression and mental-emotional disorders. Based on the results of basic health research, as many as 6.1% of the population experienced depression, and 9.8% experienced mental-emotional disorders.⁶ Research on 230 employees of the Indonesian Ministry of Health showed a stress prevalence of 79%

Based on a study of 329 medical student respondents, it was found that the prevalence of stress was 52.4%.⁸ The stress experienced can have a major effect on the condition of students both health, mental, and learning achievement to be achieved. Some researchers found that stressors and the prevalence of stress in medical students were in the range of 21.6% to 56%, where students in the first semester and last semester were in the highest case of experiencing stressful events.⁹ In several studies, this stuff can have a significant impact on academic performance or student achievement in the learning process.^{8,10} Similar studies of 201 dentistry students revealed that academic stress played a negative role in student performance and achievement in which students who experienced stress at a higher level during the exam period would be associated with a worse average score.¹¹ Another study in the United Arab Emirates (186 adolescent respondents) also showed similar results where there was a relationship between psychological stress and academic achievement.¹² The increasing level of anxiety due to the existence of the COVID-19 pandemic, make the medical students as a population that is considered vulnerable to experiencing stress during the pandemic, especially with the relatively heavy learning load.¹³ Currently, data regarding online learning stress in medical students and their relationship related to learning achievement are still very limited. Therefore, research on the stress rate of online learning in medical students and their effect on learning achievement is needed to improve the quality of online learning in the future.

METHODS

This research is an analytic observational study with a cross-sectional approach. The research was conducted at the Faculty of Medicine in one of

the universities in Bali using Google Form. Data collection was carried out for three months, starting from the fourth week of August to the first two weeks of September. The sample was selected using a non-probability sampling method, consecutive sampling technique by using a questionnaire that is conducted in Google Form to collect the data. In this study, 112 samples were obtained from students of Bachelor of Medicine and Medical Doctor batch 2018 and 2019 who were willing to fill out the questionnaires and meet the inclusion and exclusion criteria.

The inclusion criteria of this study included students in the second and fourth semester majoring in Bachelor of Medicine and Medical Doctor, registered as active students, and willing to be researched. The exclusion criteria are included students who were taking academic leave or were unable to take the exams.

The independent variable in this study is the level of stress obtained from the primary data through questionnaires, while the dependent variable is learning achievement which is obtained from the secondary data. Primary data collection was carried out using a Medical Student Stressor Questionnaire (MSSQ) questionnaire consisting of 40 items. The Medical Student Stressor Questionnaire (MSSQ) was used as a research instrument to measure student stress levels in the medical/health sciences because the constructs of validity, reliability, and internal consistency in MSSQ have been proven in several research studies.^{9,14,15} The questionnaire has been tested for validity and reliability by Statistical Package for the Social Sciences (SPSS) version 25.0, with all of the items have been declared to be valid and Cronbach's alpha coefficient value of 0.968, so the questionnaire is declared to be valid and reliable as a data measurement instrument. Stressors are grouped into 6 main stressor categories including Academic Related Stressors (ARS), Intrapersonal and Interpersonal Related Stressors (IRS), Teaching and Learning Related Stressors (TLRS), Social Related Stressors (SRS), Drive and Desire Related Stressors (DRS), and Group Activities Related Stressors (GARS) in the level of mild, moderate, high, and severe stress with respective scores of

0.00 - 1.00, 1.01 - 2.00, 2.01 - 3.00 and 3.01 - 4.00. The cumulative results of 40 items are then divided by the number of questions in each of the stressor categories, according to the original questionnaire guidelines.¹⁴

Secondary data collection was carried out through the average score of the three-block exams of online learning during the COVID-19 pandemic, namely the Medical Communication, Medical Professionalism, and Basic Pharmaceutical blocks for the second semester and the block scores for the Endocrine System, Metabolism, and Disorders, Clinical Nutrition and Disorders, and The Visual System and Disorders for the fourth semester. Data collection was carried out based on transcripts of exam scores obtained from the academic section of the Faculty.

The data were processed using the SPSS for windows version 25.0 program. Univariate analysis was performed by making variable frequency distributions in the form of numbers and percentages, while bivariate analysis is carried out by performing the Pearson test if the data is normally distributed or the Spearman test if the data is not normally distributed.

RESULTS AND DISCUSSION

The distribution of respondent characteristics can be seen in **Table 1**. The highest number of respondents came from the students of Bachelor of Medicine and Medical Doctor in the year of admission 2018 with 81 people (72.3%) while the least number of respondents came from the students of Bachelor of Medicine and Medical Doctor in the year of admission 2019 with 31 people (27.7%). These differences may due to difficulties in the sampling method using google form that is not randomized and based on an individual's willingness in filling the questionnaire. The age of the respondents was dominated by 20 years old (50%), while the least number of respondents was 22 years old (0.9%). The mean age of the students was 19.57 ± 0.066 (95% CI = 19.44-19.70). Respondents with female gender were 74 people (66.1%) while male respondents were 38 people (33.9%).

Table 1. Respondents' Characteristics

Characteristics	Frequency (N)	Percentage (%)
Study Year		
2018	81	72.3
2019	31	27.7
Age		
18	5	4.5
19	45	40.2
20	56	50
21	5	4.5
22	1	0.9
Sex		
Female	74	66.1
Male	38	33.9

The learning system preferences of medical students can be seen in **Figure 1**. Students who choose the full online learning system are 30 people (26.8%), 17 people (15.2%) offline learning system, the students who choose 30% online learning system and 70% offline are 15 people (13.4%), 50% online and 50% offline learning system are 31 people (27.7%), and the learning system preference consists of 70% online, 30% offline is 19 people (17.0%).

The highest preference rate for the learning system was 50% Online, 50% Offline as many as 31 people (27.7%), followed by the online learning system with 30 people (26.8%). This can be related to the advantages obtained with online and offline learning systems. Online learning systems have many advantages such as a very flexible schedule and can be adjusted according to the time of students and educators. Besides, online learning has advantages in terms of availability of access and economic considerations in terms of time and costs.¹⁵ This is in line with the research conducted in Texas which also has similar results where the level of satisfaction in learning online in children is higher than the offline learning system.¹⁶ However, offline systems also provide advantages that cannot be replaced by online systems, that it is easier to do the face-to-face teaching so that students easier to understand and can learn material directly from the educator, help build better skills, and socialize with others.¹⁷

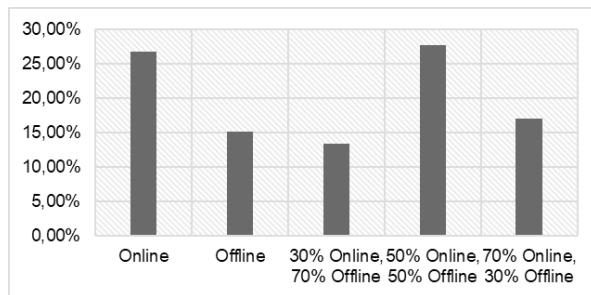


Figure 1. Learning System Preferences

In this study, the mean of the stress level distribution results was 2.46 ± 0.063 with 95% CI = 2.33-2.59. The stress level seen in a total of 112 students shows that 3 students experienced mild stress, 24 students experienced moderate stress, 62 students experienced high stress, and 23 students experienced severe stress, based on the scoring procedure carried out in the questionnaire guideline as stated in the method section.¹⁹ The distribution of student stress levels can be seen in **Table 2**.

A study of 83 medical students with the MSSQ-40 instrument, revealed the overall stress level where the average respondent experienced a stress level score above 1.0 which reflected moderate (55,7%), high stress (35,4%), but severe stress was not found.²⁰

Another study was conducted on 177 Doctor Physical Therapy (DPT) students using an MSSQ-based online questionnaire, which reported that the highest stress trigger for students comes from Drive and Desire Related Stressor (DRS) in moderate level, Academic Related Stressor (ARS) at a high level, and Teaching and Learning Related Stressor (TLRS) at a moderate level with the results showing a significant relationship.⁹ Other studies with respondents came from 260 students Health professional programs using the MSSQ instrument show that the major causes of stress come from Academic Related Stressors (ARS) and Group Activity Related Stressor (GARS) with some students experiencing stress at high and severe stress levels.¹⁸

In Indonesia, a study with MSSQ of 188 medical student respondents at the Faculty of Medicine, Andalas University found that the level of academic stress (ARS) and intrapersonal and interpersonal relationships (IRS) was the highest level of high stress, the highest level of stress was related to teaching-learning relationships (TLRS), social relationships (SRS), desire and control (DRS), and group-related activities (GARS), constitute moderate levels of stress.²¹

Table 2. Stress Level Distribution

Stress Level	Range	Frequency (N)	Percentage (%)	Mean \pm SD	p value
Mild	0-1.00	3	2.7		
Moderate	1.01-2.00	24	21.4		
High	2.01-3.00	62	55.4	2.46 ± 0.063	0.001*
Severe	3.01-4.00	23	20.5		
Total		112	100		

*Kolmogorov-Smirnov Test

In this study, the distribution of the average stressor score of the students showed that stress due to Academic Related Stressor (ARS) or due to academic load was a major factor in the occurrence of stress with an average score of 2.65 ± 0.07 while the

stressor with the smallest mean score is the Drive & Desire Related Stressor (DRS) or due to the desire of medical school with an average score of 1.71 ± 0.1 . The distribution of data based on the causes of stress can be seen in **Table 3**.

Table 3. Distribution of Stress Levels Based on Causes

Stress Level	Mild		Moderate		High		Severe		Mean ± SD	95% CI
	N	%	N	%	N	%	N	%		
ARS	2	1.8	19	17.0	49	43.8	42	37,5	2.65 ± 0.07	2.51-2.78
IRS	12	10,7	23	20,5	47	42,0	30	26,8	2.42 ± 0.08	2.26-2.58
TLRS	5	4,5	25	22,3	55	49,1	27	24,1	2.54 ± 0.07	2.40-2.67
SRS	4	3,6	30	26,8	56	50,0	22	19,6	2.41 ± 0.66	2.28-2.54
DRS	38	35	35	31,3	32	28,6	7	6,3	1.71 ± 0.1	1.52-1.90
GARS	10	8,9	29	25,9	50	44,6	23	20,5	2.40 ± 0.08	2.24-2.56

Abbreviation: ARS (Academic Related Stressor), IRS (Interpersonal & Intrapersonal Related Stressor), TLRS (Teaching and Learning Related Stressor), SRS (Social Related Stressor), DRS (Drive & Desire Related Stressor), GARS (Group Activities Related Stressor)

Stressors that are related to academic ability have been proven to be the highest source of stress for medical students.²² High academic demands such as reading schedules, student competitions that centered on the stress domain are examples of academic-related stress as a source of stress. The competition between the students is the main cause to get less time of rest which has an impact on decreasing student satisfaction and quality of life. Medical students often feel guilty for not using their free time to study.²³

In this study, we found that the source of stress with the lowest score among medical students was Drive & Desire Related Stressor. This can be supported by the fact that the medical profession is a profession that is respected in society and is considered as a proud career, so the motivation for the medical students to become part of these professionals tends to be high and come from themselves. In general, medical students, without any encouragement and desire from themselves, these students will tend to give up and easily give up on everything that must be done while undergoing medical education. However, of course, there are still small proportions who feel stress caused by drive and desire related stressors, possibly because they choose the wrong major, they are motivated by the desire of their parents or follow a friend's choice.²⁴ On the other hand, the students are still possible to lose the motivation of studying which tends to occur in the lecture process and preclinical medicine due to this stressor.²⁵

Previous study conducted in Kolkata, India revealed that most of the research respondents (94.9%) reported stress related to Academic Related Stressor (ARS).²⁰ This is supported by a study of 81 nursing students where Academic Related Stressor (ARS) is the biggest cause of stress in students.²⁶ Another study conducted by in Lebanon with MSSQ on 800 medical students from various levels of education, got the highest stress-causing results from Academic Related Stressor (ARS), followed by Teaching Learning Related Stressor (TLRS) and Social Related Stressor (SRS).¹⁹ This statement is supported by a cross-sectional study of 651 medical students and residents using the Hospital Anxiety and Depression Scale instrument, the Copenhagen Burnout Inventory, and the Medical Students' Stressor Questionnaire (MSSQ). The highest stress comes from the Academic Related Stressor (ARS) at the level of high stress.²⁷

Student learning achievement is grouped into 3 categories based on academic scores which consist of unsatisfactory (0-64.9), satisfying (65-79.9), and very satisfying (80-100). Based on **Table 4**, it can be seen that the achievement of learning achievement is less satisfactory (0-64.9) experienced by 11 respondents (9.8%), satisfying (65-79.9) experienced by 52 respondents (46.4%), and very satisfying experienced by 49 respondents (43.8%). In this study, the average/mean student achievement was 76.94 ± 0.82 (95% CI).

Table 4. Respondents Frequency Distribution Based on Learning Achievement

Stress Level	Range	Frequency (N)	Percentage (%)	Mean \pm SD	p value
Unsatisfactory	0-64.9	11	9.8		
Satisfying	65-79.9	52	46.4		
Very Satisfying	80-100	49	43.8	76.94 \pm 0.82	0.012*
Total		112	100		

*Kolmogorov-Smirnov Test

Numerical data of stress score and age on learning achievement were analyzed with the Spearman correlation because each data was not normally distributed based on the Kolmogorov-Smirnov normality test. The data in Table 5 shows that there is a significant relationship ($p < 0.005$) between stress

with learning achievement. The relationship between the two variables shows a negative correlation with a weak correlation strength level (-0.217) with a 95% CI -0.39 to -0.03. This shows the level of stress does affect one's learning achievement, but with a low level of influence.

Table 5. The Relationship Between Stress Score and Age Related to Learning Achievement

Variable	p value	Correlation coefficient	95% CI	
			Lower	Upper
Stress Score	0.021	-0.217	-0.39	-0.03
Age	0.538	0.059	-0.13	0.24

Dependent Variable: Learning Achievement

This result is in accordance with the statement that stress affects the process and results of academic achievement or a learning achievement.²⁸ These results are also in line with research conducted in Semarang, Indonesia which states that there is a significant relationship between stress levels and learning achievement with a value of $p = 0.005$.²⁹ Other research also states that there is a relationship between stress levels and learning achievement with the Spearman correlation test resulting in $p = 0.004$ which is carried out on students of the Faculty of Medicine, the University of Mataram where the higher the student's stress level results in lower learning achievement.³⁰ Previous study also stated that there are many factors related to learning achievement and a person's psychology.³¹ Psychological factors play an important role in the learning process and its achievement. Mood, feelings, and emotions determine a person's condition. Stress can interfere with a person's development in many ways. The disruption of physical and psychological

health causes students to tend to be easily tired, dizzy, and difficult to concentrate on receiving lessons that result in less than optimal learning achievement or achievement. One study stated that the greatest amount of long-term stress will have an impact, one of which is on achievement and work.³² The research also revealed that students who are most vulnerable to stress are students in the medical field due to high academic challenges when compared to other disciplines.²⁸ Online learning also might have impacts on student's achievement due to hardships in making a fully fair method in assessing student's achievement, considering the final mark of student achievement is mostly determined by examination that is conducted online with a lack of supervision. It is also possible that other predictor variables may correlate with the final learning achievement, considering the nature of online learning that can be conducted anywhere, not in the same conventional room as offline learning. Although stress factor might be the most interesting

topics to discuss, especially during the COVID-19 pandemic, it is likely that other variables, such as course's contents, administrative and technical supports both from the students and e-learning system that might have implications on student's achievement based on previous studies about online learning.^{33,34}

These results give new insights into an overview of stress factors and the learning achievement of medical students during online learning, especially in the COVID-19 pandemic. However, this study still has several limitations. First, due to pandemics and social distancing policies, the instrument was carried in the form of a self-questionnaire that was distributed online so that it did not escape the filling bias due to limitations in supervising questionnaire filling for each respondent. Second, due to certain circumstances, the sampling method is not randomized, so that there might be bias in selecting the research sample. Third, although we believe that the questionnaire itself may already cover the majority cause of stress that contributed to the general level of stress in medical students, it is also possible that there are other significant variables contributing to the learning achievement that is not accounted as the predictor variable in this study, such as learning environment, numbers of non-academic activities involved, or assessment method. This may open possibilities of research in the future emphasizing this topic on online learning.

CONCLUSION

Based on this research, it can be concluded that the stress level of medical students in online learning in the COVID-19 era is dominated by high stress with the cause of stress being dominated by ARS (Academic Related Stressor) or stress due to academic load. There is a significant relationship between the incidence of stress and academic student achievement, but the strength of the correlation is low. Online learning can encourage a more optimal learning system change by utilizing digitalization rather than fully conventional face-to-face learning, as evidenced by the preferences of medical students which are dominated by online learning systems combined in half with offline learning systems.

RECOMMENDATION

Future research should be directed towards finding other factors that can influence learning achievement apart from stress on online learning, given the low correlation obtained in this study. Research to analyze the strengths and weaknesses of online learning that is conducted based on the student's preferences is also needed, in order to improve the quality of online learning and the implementation of online learning policies in Indonesia.

COMPETING INTEREST

The authors declare that there is no conflict of interest whatsoever regarding the studies of this manuscript.

LIST OF ABBREVIATIONS

MSSQ	: Medical Student Stressor Questionnaire
ARS	: Academic Related Stressor
IRS	: Interpersonal & Intrapersonal Related Stressor
TLRS	: Teaching and Learning Related Stressor
SRS	: Social Related Stressor
DRS	: Drive & Desire Related Stressor
GARS	: Group Activities Related Stressor

AUTHORS' CONTRIBUTION

Putu Nandika Tungga Yudanti Mahardani – research proposals, data collection, data analysis, and publications.

Sri Darmayani – research proposals, data collection, and publications.

Dyah Kanya Wati – research proposals, data collection, and publication.

Maria Elisabeth Sylvinna Wasi Elannor – research proposals, data collection, and publication.

Ketut Wulan Ari Kartika Ardhaputri – research proposals, data collection, and publication.

Andreliano Yosua Rompis – research proposals and publications.

REFERENCES

1. Arizona K, Abidin Z, Rumansyah R. Pembelajaran Online Berbasis Proyek Salah Satu Solusi Kegiatan Belajar Mengajar di Tengah Pandemi Covid-19. *Jurnal Ilmiah Profesi Pendidikan*. 2020; 5(1): 64-70.
2. Kemendikbud. Kemendikbud Gandeng Swasta Siapkan Sistem Belajar Daring. [Internet]. Available from: <https://www.kemdikbud.go.id/main/blog/2020/03/kemendikbud-gandeng-swasta-siapkan-sistem-belajar-daring>. 2020 [Cited 2020 July 18]
3. David Sam Jayakumar GS, Sulthan A. Stress Symptoms: Structural Equation Modelling. *SCMS Journal of Indian Management*. *Journal of Indian Management*. 2013; 10: 95-109.
4. Yaribeygi H, Panahi Y, Sahraei H, Johnston TP, Sahebkar A. The impact of stress on body function: A review. *EXCLI Journal*. Leibniz Research Centre for Working Environment and Human Factors. 2017; 16: 1057-1072.
5. American Psychological Association. 2015. Stress in America. [Internet]. Available from: <https://www.apa.org/news/press/releases/stress/2015/snapshot; 2015>. [Cited 2020 July 20].
6. Kementerian Kesehatan. Riset Kesehatan Dasar 2018. [Internet]. Available from: https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-risikesdas-2018_1274.pdf. 2018. [Cited 2020 July 21].
7. Besral, Widiyanti W. Determinan Stres pada Pegawai Kementerian Kesehatan Indonesia. *Jurnal Kesehatan Masyarakat Nasional*. 2015; 9(3): 222-228.
8. Melaku L, Mossie A, Negash A. Stress among Medical Students and Its Association with Substance Use and Academic Performance. 2015; 10: 1-9
9. Afridi A, Fahim MF. Identification of stressors and Perceptual difference of stress in first and final year Doctor of Physical Therapy students; a comparative study. *Journal of the Pakistan Medical Association*. 2019; 69(4): 572-575.
10. Regehr C, Glancy D, Pitts A. Interventions to reduce stress in university students: A review and meta-analysis. *Journal of Affective Disorder*. 2013; 148: 1-11.
11. Crego A, Carrillo-Diaz M, Armfield JM, Romero M. Stress and Academic Performance in Dental Students: The Role of Coping Strategies and Examination-Related Self-Efficacy. *Journal of Dental Education*. 2016; 80(2): 165-172.
12. Ali NM, Nowshad NA, Mansoor KM, Ibnouf RA, Albehiery RM, Carrick FR, Abdulrahman M. Perceived Academic and Psychological Stress among Adolescents in United Arab Emirates: Role of gender, age, depression, and high expectation of parents. *Psychiatria Danubina*. 2019; 31(Suppl 3): 331-337.
13. Saddik B, Hussein A, Sharif-Askari FS, Kheder W, Temsah MH, Koutaich RA, Halwani R. Increased levels of anxiety among medical and non-medical university students during the COVID-19 pandemic in the United Arab Emirates. 2020; 13: 2395-2406
14. Yusoff MSB. The development and validity of the medical student stressor questionnaire (MSSQ). *ASEAN Journal of Psychiatry*. 2010; 11(1): 13-24. Retrieved from: https://www.researchgate.net/publication/228486045_The_Development_and_Validity_of_the_Medical_Student_Stressor_Questionnaire_MSSQ
15. National Center for Education Statistics. Distance Education at Degree-Granting Postsecondary Institutions: 2006-07 [Internet]. Available from: <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2009044>. 2008. [Cited 2020 July 19].
16. Singh S, Rylander D, Mims T. Efficiency of Online vs. Offline Learning: A Comparison of Inputs and Outcomes. *International Journal of Business, Humanities, and Technology*. 2012; 2(1): 94-98.
17. Zhong X. Development and Application of Offline Learning System in College Teaching. *International Journal of Emerging Technologies in Learning*. 2015; 10(5): 35-39.

18. Al-Qahtani MF, Alsubaie ASR. Investigating Stress and Sources of Stress Among Female Health Profession Students in a Saudi University. *Journal of Multidisciplinary Healthcare*. 2020; 13: 477-484.
19. Samaha A, Al Tassi A, Yahfoufi N, Gebbawi M, Rached M, Fawaz MA. Data on The Relationship between Caffeine Addiction and Stress among Lebanese Medical Students in Lebanon. *Data in Brief*. 2019; 28: 104845.
20. Gupta S, Choudhury S, Das M, Mondol A, Pradhan R. Factors Causing Stress Among Students of Medical College in Kolkata, India. *Educ Health (Abingdon)*. 2015; 28(1): 92-95.
21. Rahmayani RD, Liza RG, Syah NA. Gambaran Tingkat Stres Berdasarkan Stressor pada Mahasiswa Kedokteran Tahun Pertama Program Studi Profesi Dokter Fakultas Kedokteran Universitas Andalas Angkatan 2017. *Jurnal Kesehatan Andalas*. 2019; 8(1): 103-111.
22. Bergmann C, Muth T, Loerbroks A. Medical students' perceptions of stress due to academic studies and its interrelationships with other domains of life: a qualitative study. *Medical Education Online*. 2019; 24(1): 1603526.
23. Ruzhenkova VV, Ruzhenkov VA, Lukyantseva IS, Anisimova NA. Academic stress and its effect on medical students' mental health status. *Drug Invention Today*. 2018; 10: 1171-1174.
24. Molnár R, Nyári T, Hazag A, Csinády A, Molnár P. Career choice motivations of medical students and some characteristics of the decision process in Hungary. *Central European Journal of Medicine*. 2008; 3(4): 494-502.
25. Yusoff B, Saiful M, The Medical Student Stressor Questionnaire (MSSQ) Manual An explanatory guide on stress and stressors in medical study to help you. 2010.
26. Brown K, Anderson-Johnson P, McPherson AN. Academic-related stress among graduate students in nursing in a Jamaican school of nursing. *Nurse Education in Practice*. 2016; 20: 117-124.
27. Pokhrel NB, Khadayat R, Tulachan P. Depression, anxiety, and burnout among medical students and residents of a medical school in Nepal: a cross-sectional study. *BMC Psychiatry*. 2020; 20(1): 298.
28. Bamuhair S, Farhan A, Althubaiti A, Agha S, Rahman S, Ibrahim N. Sources of Stress and Coping Strategies among Undergraduate Medical Students Enrolled in a Problem-Based Learning Curriculum. *Journal of Biomedical Education*. 2015: 1-8.
29. Rahmi N. Hubungan Tingkat Stres dengan Prestasi Belajar Mahasiswa Tingkat II Prodi D-III Kebidanan Banda Aceh Jurusan Kebidanan Poltekkes Kemenkes. *Jurnal ISU*. 2013; 2: 1-4.
30. Putra R, Widiastuti I, Affarah W. Hubungan Antara Tingkat Stres dengan Prestasi Belajar Mahasiswa Fakultas Kedokteran Universitas Mataram. *Jurnal Kedokteran*. 2014; 3(1).
31. Mustaqim. *Psikologi Pendidikan*. Semarang: Pustaka Pelajar. 2008.
32. Mahakud GC, Sharma V, Gangai KN. Stress Management : Concept and Approaches. *The International Journal of Humanities & Social Studies*. 2018; 1(6): 1-5.
33. Ismail AO, Mahmood AK, Abdelmaboud A. Factors influencing academic performance of students in blended and traditional domains. *International Journal of Emerging Technologies in Learning (ijET)*. 2018; 13(2): 170-187.
34. Sankar J, Kalaichelvi R, John J, Menon N, Elumalai K, Alqahtani M, Abumelha M. Factors Affecting the Quality of E-Learning During the COVID-19 Pandemic from the Perspective of Higher Education Students. *Journal of Information Technology Education: Research*. 2020; 19(1): 731-753.