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Research Article,

Impact of The COVID-19 Pandemic on Educational Crisis in Medical Students: Prevalence and Associated Factors

Panu Boontoterm[1], Nutnaree Thuncharoon[2], Pusit Fuengfoo[3], Damrong Waealee[4], Tunyaluk Witusurapot[5]

[1]Neurosurgical unit, Department of surgery and Division of Pulmonary and Critical Care Medicine, Department of Medicine, Phramongkutklao Hospital, Bangkok, Thailand
[2] Residency training, Department of Surgery, Phramongkutklao Hospital, Bangkok, Thailand
[3]Department of Surgery, Phramongkutklao Hospital, Bangkok, Thailand
[4]Head of Yala medical educational center subunit of faculty of medicine Prince of Songkla university Yala Hospital, 152 Siroroj Road, Sateng, Meung , Yala 95000
[5]Department of Ophthalmology, Yala Hospital, 152 Siroroj Road, Sateng, Meung , Yala 95000
E-mail Address: sapiens_panu@hotmail.com

Abstract:

Background: Educational crisis causes medical students emotional stress and associated with increasing medical educational-related disillusionment and has never been clarified and gained attention secondary to concerns regarding study performance. COVID-19 pandemic has raised public health problems, Educational crisis and physical exhaustion have more pronounced. Medical students seem more exposed due to the prolong online study, less time to practice, and risk to contact with COVID-19 and had COVID-19 infection. The aim is to study the prevalence and related factors.
Methods: Multicenter, prospective cross-sectional study. Educational crisis were collected from medical students in most epidemics covid-19 areas in Bangkok and southern areas using electronic questionnaires from February 2021 to January 2022. Educational crisis was defined when medical students exhibited at least 1 of 3 aspects (depersonalization, emotion exhaustion and personal accomplishment) and COVID-19 related stressors. Primary outcome was prevalence of educational crisis and secondary outcomes were risk factors.
Results: Among 266 medical students, 11.6% had depression and 30.5% had COVID- 19 infection. Prevalence of educational crisis was 49.5% with the highest score found decreased personal accomplishment section (32.57 ± 7.79). The risk factors were COVID-19 infection, female, duration of clinical experience, poor sleep quality, conflict with co-worker, feeling that unfit and inappropriate to be doctor and feeling that they wanted resign from medical students within the past year.
Conclusion: In this study, we found a high prevalence of educational crisis among medical students. Early prevention of mental health problems and psychological intervention should be conducted for medical students during the pandemic.

Keywords: educational crisis, medical students, Emotion exhaustion, Depersonalization, Personal accomplishment, COVID-19 pandemic.

Introduction:

Educational crisis is a state of boredom in going on study. Physical, mental, and emotional exhaustion (EE) is caused by being in situations involving emotional needs for extended periods of time during study[1]. Educational crisis causes negative effects both physically and mentally during study period, such as deteriorating health,

becoming nonfunctioning, easily angered, irritable mood, unenthusiastic, and lacking initiative to reward system leading to depression. In addition, Educational crisis can be severe to the point of reigning from medical education causing problems for the medical students, resulting in the deteriorating performance of the organization[2]. Lerthattasilp T.[3] studied crisis among Thai psychiatrists. The results showed that Thai psychiatrists experienced a high level of EE (17.1%). The factor that increased EE was overall dissatisfaction with study and work, fewer of years working as a psychiatrist and lack of co-worker support. The Medical Council of Thailand conducted a study on reasons for medical resignation in 2015 by surveying the opinions of medical students to understand the problems and the reasons to resign. A retrospective survey of 4 years was conducted involving fresh graduates. The three main reasons were related: the compensation received was too low; the burden of responsibility was overload and the requirement to studying in remote areas[4]. Educational crisis is now widely recognized. The US reported 45.8% concerning overall educational crisis. Substantial differences in educational crisis were observed by specialty, with the highest rates among medical students at the front line of care access (family medicine, general internal medicine, and emergency medicine)[5]. The study by the European Research Network educational crisis Study Group, including 1,400 families' medical students in 12 European countries, revealed the following: 43% of respondents scored high for EE, 35% for depersonalization (DP) and 32% for low personal accomplishment (PA), while 12% of medical students suffered from educational crisis in all three dimensions[6]. Another study that included more than 500 medical students in the UK demonstrated that at least one third of the medical students revealed educational crisis features[8]. However, the prevalence and factors leading to educational crisis have not been reported in the Thai medical students. Therefore, the researcher was interested in studying the prevalence of educational crisis and related factors among Thai medical students.

The study aimed to provide information, explore ways to prevent educational crisis, correct and direct care of Thai medical students to perform their studies and duties happily with maximum abilities.

Materials and Methods:

We conducted a multicenter, cross-sectional analytic study. Data from all 266 medical students were collected by using electronic surveys. We included medical students from Phramongkutklao College of medicine and Yala medical educational center subunit of faculty of medicine Prince of Songkla University in the survey by simple random sampling from email register in this study from 2020 to 2022. The Institutional Review Board, Royal Thai Army Medical Department Ethics Committee approved this study. Exclusion criteria included medical students less than 18 years of age and not consenting to the questionnaire. The sample population was calculated from a literature review by Lerthatthasilp T.[3] Therefore, several sample sizes were required of least 154 cases in this study.

After being approved by the Human Research Ethics Committee, the researcher selected medical students meeting the selection criteria. The objectives of the research were clarified, and medical students were asked to join the research project by providing a voluntary consent form. The tool used to collect data comprised a electronic self-report questionnaire. We conducted an electronic survey-based study. The questionnaire consisted of four parts described below 1) Basic information consisted of 8 items, consisting of general information such as age, sex, underlying disease, history of psychiatric problem, history of covid-19 infection, ward study characteristics and experience medical educational received 2) ward study characteristics comprised 25 items such as total number of beds in the medical student study, average number of case study admitted to the study ward, number of patients requiring care per medical students, total number of patients in one shift, number of patients requiring ventilator, number of terminally ill patients, average number of deaths in study ward and the average number of hours required to study and ward work 3) Personal data consisted of 9 items 4) Maslach Burnout Inventory-Human Services Survey Thai version (MBI- HSS) consisted of 22 items, divided in criteria, graded on seven levels, and dividing the evaluation results in three aspects as detailed below. A. emotional exhaustion (EE) means feeling tired, having no strength in the face of daily study B. depersonalization (DP) means having negative feelings or not understanding the patients, lack of

connection to others or study case without dignity C. personal accomplishment (PA) means feeling ineffective, unable to study and perform tasks or care for cases. The
Questionnaire's item answers were rated on a 7-level scale, with scoring criteria shown
As below. Those scoring in the top third of each scale (reversed for PA) were considered to exhibit educational crisis. We used the Thai version of the MBI-HSS translated by Sammawart S.[7] that was verified by experts and tested for reliability using Cronbach's coefficient alpha: EE 0.92, DP 0.66, and PA 0.65, which were rated as acceptable to excellent. The questions for EE numbered 1, 2, 3, 6, 8, 13, 14, 16, 20. The questions for DP numbered 5, 10, 11, 15, 22. The questions for PA numbered 4, 7, 9, 12, 17, 18, 19,
21. Educational crisis was defined when medical students exhibited at least 1 of 3 Aspects of emotional exhaustion (EE), depersonalization (DP) or decreased personal Accomplishment (PA) that showed as below

	High	Average	Low
Emotional exhaustion (EE)	≥ 27	17-26	< 16
Depersonalization (DP)	≥ 13	7-12	< 6
Decreased personal accomplishment (PA	≤ 31	32-38	> 39

Statistical Analysis:
Fundamental data, behavior information, personal information, and data on fatigue at medical educational study were presented as using percentage, mean, and standard deviation. The prevalence of educational crisis was determined among medical students when any one of these, compatible with educational crisis was presented. Factors associated with educational crisis were analyzed using multivariate logistic regression analyses, independent-t test and chi-square test indicating that correlations between the results of the factors did not cause any discrepancy with the logistic-regression analyses. The correlation level used adjusted odd ratio (OR) and 95% CI and statistical significance was set at p-value < 0.05. Data were analyzed from baseline and consequent behaviors, selecting important values for multivariate logistic regression analysis, and p-value < 0.05. The reliability of the MBI Thai version was tested using the Cronbach's alpha method (α>0.7, reliable). In this study, the analysis value was calculated using SPSS Program, Version 23.

Ethics approval and consent to participate
Institutional Review Board Royal Thai Army Medical Department Ethics Committee approved this study on April 25, 2022. Research no.S017h/65 followed Council for International Organization of Medical Science (CIOMS) Guidelines 2012 and Good Clinical Practice of International Conference on Harmonization statement no.IRBRTA 0543/2565.

Result:

Medical student characteristics
This study included 266 subjects totaling medical students. The average age was 22.28 ± 3.05 years; 164 were males (61.65%). Most medical students studied in medicine department, 124 (46.62%). Most workplaces were Southern-border region, 159 subjects (59.77%). Most were no clinical experience (pre-clinic medical students), 77 subjects (28.95%). Most co-morbidity were covid-19 infection, 81 subjects (30.5%). Depression were 30 subjects (11.6%). Monthly Family income mean was 120,680 ± 20,076 THB. The mean studying hour per day was 9 ± 2.3 hours. The greatest number of medical student's religion was Buddhist, 208 (78.2%). The mean GPA accumulation was 3.3 ± 1.2. The mean exercise (times/week) was 4.3 ± 1.6 as shown in Table 1. In all, 5.35 ± 2.92 patients were average number of patients in service with ventilator. The average number of patients in service with end-of-life care was 1.18 ± 0.92. The average number of patients in service with death was 1.04 ± 0.45. The average number of shifts that medical students have to care for a patient was 1.92 ± 0.37. The average number of rest days that medical students receive weekly was 2.29 ± 0.75. The greatest average number of patients in service (per week) was below 2 patients, 111 (41.73%). The greatest length of stay for a patient in service was below 2 days, 93 (34.96%).The average numbers of patients: medical student ratio was 1:3.6 ± 1.07. The average number of patients in service with end-of-life care (per week) was below 2 cases, 239 (89.85%). The average number of patients in service with death was below 2 cases, 248 (93.23%). In one week, medical student had to care for patient's overtimes at an average 3.82 ± 1.6 shifts and in 1 week had rest days on an average of 2.29 ± 0.75 days as shown in Table 2.

Table 1. Demographic data of 266 medical students in this study

Demographic data	Central area	Southern-border	Total
Sex			
Male	71 (26.70)	93 (34.96)	164 (61.65)
Female	36 (13.53)	66 (24.81)	102 (38.35)
Age			
Mean ± S.D.	21.06 ± 3.73	23.50 ± 2.36	22.28 ± 3.05
Educational ward			
Medicine	70 (26.32)	54 (20.30)	124 (46.62)
Surgery	49 (18.42)	33 (12.41)	82 (30.83)
Pediatric	15 (5.64)	13 (4.89)	28 (10.53)
Obstetrics and Gynecology	10 (3.76)	8 (3.01)	18(6.77)
Others ward	6 (2.26)	8 (3.01)	14 (5.26)
Clinical experience			
> 2 year	31 (11.65)	41 (15.41)	72 (27.07)
1 – 2 year	26 (9.77)	27 (10.15)	53 (19.92)
6 month – 1 year	23 (8.65)	15 (5.64)	38 (14.29)
< 6 month	15 (5.64)	11 (4.14)	26 (9.78)
Pre-clinic	38 (14.29)	39 (14.66)	77 (28.95)

Value present as Mean and Mean ± S.D.

Variables	N = 266
Male, n (%)	164 (61.7)
Smoking	59 ± 5
Alcohol use	62 ± 16
Co-morbidity, n (%)	
Covid-19 infection	81 (30.5)
Depression	30 (11.6)
Drug abuse (Benzodiazepine)	23 (8.6)
History of psychiatric problem	19 (7.1)
Gout	3 (1.1)
Variables	Mean ± SD.
Studying hour per day (hr)	9 ± 2.3
Family incomes	120,680 ± 20,076
Average number of patients in service with ventilator	5.35 ± 2.92
Average number of patients in service with end-of-life care	1.18 ± 0.92
Average number of patients in service with death	1.04 ± 0.45
Shifts that medical students have to care for a patient overtime	1.92 ± 0.37
Religion , n (%)	
Buddhist	208 (78.2)
Muslim	50 (18.8)
Christian	8 (3)
GPA accumulation	3.3 ± 0.9
Exercise (Times/week)	4.3 ± 1.6

Value present as Mean and Mean ± S.D.

Table 2 Demographic data in educational work-load in each groups.

Educational-load	Central area	Southern-border	Total
Average number of patients in service with ventilator per week			
Mean ± S.D.	3.1±2.49	7.6±3.35	5.35 ± 2.92
Average number of patients in service (per week)			
< 2	52	59	111
2-4	33	42	75
4-6	20	26	46
6-8	6	6	12
8-10	3	8	11
>10	4	7	11
Average length of stay for a patient in service (days)			
< 2	68	95	163
2-5	17	12	29
6-10	15	13	28
11-15	12	11	23
16-20	8	6	14
> 20	4	5	9
Patients : medical student ratio			
Mean ± S.D.	1:4.8 ± 0.77	1:2.4 ± 1.37	1:3.6 ± 1.07
Average number of patients in service with end-of-life care (per week)			
< 2	112	127	239
2-5	3	14	17
5-10	1	6	7
> 10	2	1	3
Average number of patients in service with death			
< 2	131	117	248
2-5	5	8	13
5-10	2	2	4
> 10	0	1	1
How many shifts did you have to care for a patient overtime? (per shift)			
Mean ± S.D.	1.31 ± 0.22	2.53 ± 0.52	1.92 ± 0.37
How many shifts did you have to care for a patient overtime? (per week)			
Mean ± S.D.	2.32 ± 1.36	5.32 ± 1.84	3.82 ± 1.6
How many shifts did you have to care for a patient overtime? (per month)			
Mean ± S.D.	5.36 ± 2.26	10.36 ± 2.59	7.86 ± 2.43
How many rest days do you receive on average weekly?			
Mean ± S.D.	2.18 ± 0.83	2.39 ± 0.66	2.29 ± 0.75

Value present as Mean and Mean ± S.D.

Medical student's personal data

The majority thought that the rest days weekly was insufficient (59.02%). The average number of days of rest required weekly was 2.29 ± 0.75 days. In all, 66.17% felt that the work-loaded related medical education were too numerous. Altogether 59.02% felt that they had no time for their family. Totally, 19.92% felt that they were unfit and inappropriate to be doctor by themselves. In total, 16.92% felt that they wanted to stop learning and caring for patients and resign from medical students within the past year. Fully, 33.83% had poor sleep quality during study and 77.07% had conflicts with conflict with co-worker or teacher during study. Exactly, 14.66% had conflicts with patients in responsibility during study and 30.5% had Covid-19 infection as shown in Table 3.

Baseline characteristics between two groups of medical students

Table 3. Baseline characteristics comparison between two groups of medical students

Baseline characteristics	Central area	Southern-border	Total
Rest days receive on average per week			
Adequate	54 (20.30)	55 (20.68)	109 (40.98)
Not-adequate	82 (30.83)	75 (28.20)	157 (59.02)
Rest days receive on average per week (Day)			
Mean ± S.D.	2.18 ± 0.83	2.39 ± 0.66	2.29 ± 0.75
Feel more work-loaded related medical education			
Yes	70 (26.32)	106 (39.85)	176 (66.17)
No	35 (13.16)	55 (20.67)	90 (33.83)
Feel no time to meet his/her family			
Yes	59 (22.18)	98 (36.84)	157 (59.02)
No	32 (12.03)	77 (28.95)	109 (40.98)
Feel that no appropriate to be doctor by himself/herself			
Yes	26 (9.77)	27 (10.15)	53 (19.92)
No	85 (31.96)	128 (48.12)	213 (80.08)
Feel that want to resign during 1 year			
Yes	16 (6.02)	29 (10.90)	45 (16.92)
No	98 (36.84)	123 (46.24)	221 (83.08)
Feel that poor sleep quality during study			
Yes	43 (16.16)	47 (17.67)	90 (33.83)
No	62 (23.31)	114 (42.86)	176 (66.17)
Having conflict with co-worker or teacher during study			
Yes	97 (36.47)	108 (40.60)	205 (77.07)
No	32 (12.03)	29 (10.90)	61 (22.93)
Having conflict with patients in responsibility during study			
Yes	16 (6.01)	23 (8.65)	39 (14.66)
No	98 (36.84)	129 (48.50)	227 (85.34)
Covid-19 infection	37 (13.93)	44 (16.57)	81 (30.5)

Value present as Mean and Mean ± S.D.

Table4. Primary outcome in terms of prevalence of educational crisis comparison between two groups of medical students

Educational crisis	Central area	Southern-border	Total
Educational crisis	43 (16.42)	88 (33.08)	131 (49.5)
No educational crisis	59 (21.93)	76 (28.57)	135 (50.5)

Value present as Mean.

Table 5. Secondary outcome in subgroup analysis of educational crisis in medical students

Subgroup analysis of educational crisis	Mean.	SD.	Grading scale in stress related medical education		
			Low	Moderate	high
Emotional exhaustion	22.72	12.63	44 (33.59)	40 (30.53)	47 (35.88)
Depersonalization	5.57	5.04	89 (67.94)	23 (17.56)	19 (14.50)
Decreased personal accomplishment	32.57	7.79	22 (16.79)	44 (64.59)	65 (49.62)

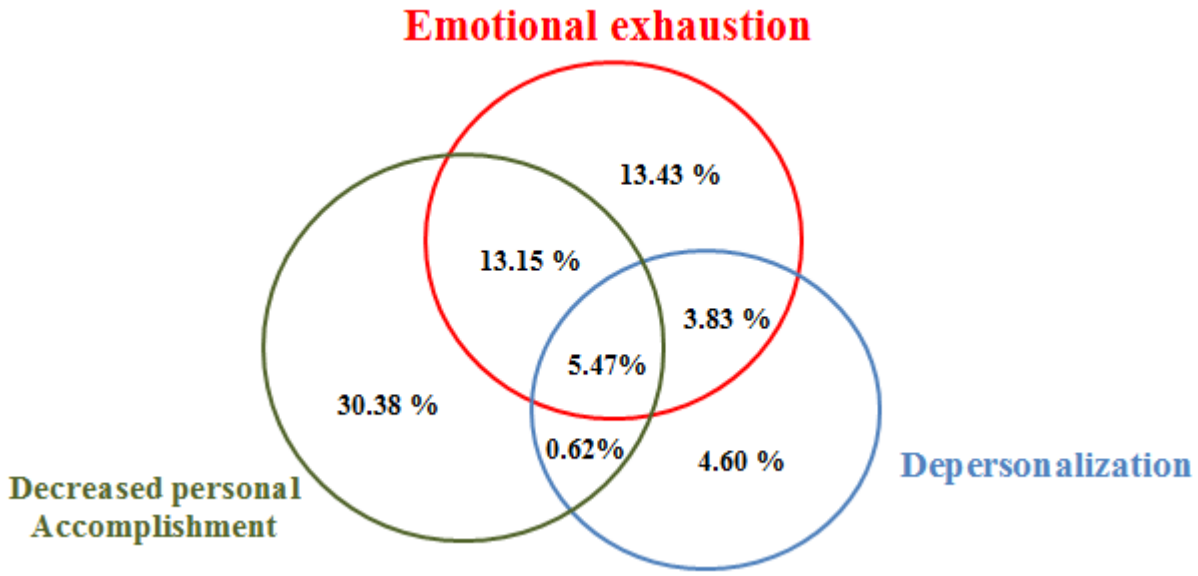

Figure 1. Secondary outcome in component of educational crisis in medical students

Prevalence of educational crisis

131 participants or 49.5% experienced educational crisis as shown in Table 4, from decreased PA at a high level 65 (49.62%) participants, from EE 47 (35.88%) participants and from DP 19 (14.50%) participants as shown in Table 5. The proportion of medical students presented with component of educational crisis, classified by its severity is shown in Fig 1. Secondary outcome in component of educational crisis in medical students.

Multivariate logistic regression analysis for educational crisis

The factors affecting educational crisis for medical students included 1) Female [2.44 (1.27 - 12.15), p=0.014], 2) duration of clinical experience [4.43 (2.11 - 15.42), p=0.008], 3) Covid-19 infection [35.92 (3.12-119.56), p=0.002], 4) poor sleep quality during study [19.77 (1.35 - 45.28), p=0.015], 5) conflict with co-worker or teacher during study [1.41 (1.12 - 9.28), p=0.044], 6) feeling that they were unfit and inappropriate to be doctor by themselves [9.89 (7.12 - 73.28), p=0.006] and 7) feeling that they wanted to stop learning and caring for patients and resign from medical students within the past year [3.95 (1.12 - 8.25), p=0.027] as shown in Table 6.

Table 6. Multivariate analysis in educational crisis in medical students

Variable	Educational crisis		Adjusted OR (95%CI)	p-value
	No	Yes		
Sex				
Male	97 (36.47)	67 (25.19)	Reference	
Female	38 (14.29)	64 (24.06)	2.44 (1.27 - 12.15)	0.014
Educational ward				
Medicine	59 (22.18)	65 (24.44)	Reference	
Others	76 (28.57)	66 (24.81)	0.78 (0.43 - 1.57)	0.78
Clinical experience				
Clinic	115 (43.23)	74 (27.82)	Reference	
Pre-clinic	20 (7.52)	57 (21.42)	4.43 (2.11 - 15.42)	0.008
Rest days receive on average per week				
Adequate	48 (18.04)	61 (22.93)	Reference	
Not-adequate	87 (32.71)	70 (26.32)	0.63 (0.13 - 4.61)	0.421
Covid-19 infection				
No	130 (48.87)	55 (20.68)	Reference	-
Yes	5 (1.88)	76 (28.57)	35.92 (3.12-119.56)	0.002
Feel that poor sleep quality during study				
No	126 (40.00)	51 (60.00)	Reference	
Yes	10 (18.75)	80 (81.25)	19.77 (1.35 - 45.28)	0.015
Having conflict with co-worker or teacher during study				
No	35 (13.16)	26 (9.77)	Reference	
Yes	100 (37.59)	105 (39.47)	1.41 (1.12 - 9.28)	0.044
Feel more work-loaded related medical education				
No	21 (7.89)	69 (25.94)	Reference	
Yes	114 (42.86)	62 (23.31)	0.17 (0.12 - 2.28)	0.53
Feel no time to meet his/her family				
No	50 (18.80)	59 (22.18)	Reference	
Yes	85 (31.96)	72 (27.01)	0.72 (0.03 - 3.18)	0.76
Feel that no appropriate to be doctor by himself/herself				
No	128 (18.80)	85 (22.18)	Reference	
Yes	7 (31.96)	46 (27.01)	9.89 (7.12 - 73.28)	0.006
Feel that want to resign during 1 year				
No	124 (46.62)	97 (36.47)	Reference	
Yes	11 (4.14)	34 (12.78)	3.95 (1.12 - 8.25)	0.027
Having conflict with patients in responsibility during study				
No	117 (43.98)	110 (41.35)	Reference	
Yes	18 (6.77)	21 (7.90)	1.24 (0.12 – 4.73)	0.081

Value presented as mean. or n (%). P-value corresponds to Independent-t test and chi-square test.

Discussion:

In this study, educational crisis was investigated. The results showed that the prevalence of educational crisis among medical students diagnosed by three aspects was high, and at a high level of EE, DP, and PA. From this study, the major risk factors in the multivariate analysis were COVID-19 infection during study, female, duration of clinical experience, poor sleep quality, conflict with co-worker or teacher during study, feeling that they were unfit and inappropriate to be doctor and feeling that they wanted to stop learning and caring for patients and resign from medical students within the past year. Educational crisis was first described in the 1970s as a educational-related condition causing signs and symptoms to appear[8]. Diagnosis is based on the MBI questionnaire, consisting of 22 questions and seven levels of severity, calculated as a score and then diagnosed[9]. However, the diagnostic value of medical students in each study differed. This made it difficult to compare individual studies. A study compiled in 2016 found that the main risk factors included young age, male gender, little

duration of clinical experience, studying hours and studying and caring for patients in service with end of life[10]. The prevalence of educational crisis among medical students was about 25 to 33% among medical students in several related studies[10-12]. Due to COVID-19 pandemic has raised public health problems around the world. In this context, Educational crisis and physical exhaustion have become even more pronounced and more prevalence than several related studies[10-12] before the pandemic so in this study 49.5% of medical students experienced educational crisis that showed high prevalence compared with several related studies[10-12]. Medical students seem even more exposed due to the prolong online study, less time to practice or short or never got duration of clinical experience, and risk to contact with COVID-19 patients and had COVID-19 infection. Educational crisis causes medical students emotional stress and associated with increasing medical educational-related disillusionment. Educational crisis in medical students has never been clarified and gained significant attention secondary to concerns regarding study performance and how to perform patients care. From this study, 131 medical students (49.5%) had educational crisis, divided in EE 35.88%, DP 14.50% and PA 49.62%. The educational crisis study in 2011 by Lerthattasilp T. found that EE accounted for 17.1% on DP 5.5% and PA 7.7%. The 1989 educational crisis study by Summawart S. among in Ramathibodi Hospital found that EE accounted for 68.1% DP, 53.7% and PA, 56.5%7. Comparing this study with related studies in Thailand revealed that medical students studying in the duration of COVID-19 pandemic experienced more educational crisis than medical students studying before the pandemic. This may be due to the difference in means to study between medical students: the higher the mortality rate among COVID-19 patients, the higher the severity of the COVID-19 disease, different in variability of case study and work-loaded of teaching staff that had to help public health policy in acute respiratory infection clinic or cohort intensive care unit or cohort department and hospital, different rest days; and therefore, different outcome data. However, when compared with medical students studying in other countries, more prevalence of educational crisis were found among Thai medical students. This was most likely due to much work-loaded of teaching staff and less rest time. Studying and caring for patients in the present would have been more difficult than the past with more assistive devices for standard precaution in aerosol generating procedure protection and the drugs used were more items as the present in case of COVID-19 patients, different mortality rates among other countries, etc. Nonetheless, when compared with medical students studying in other countries, Thai medical students experienced higher prevalence of educational crisis. The reason was probably from the environment in the organization and receiving too many assignments. From the results of the risk factors among medical students, Covid-19 infection in health care provider Thailand, the responsibilities and duties received were compared with other countries quite high. In addition, factors included having less rest time on average, 2.29 ± 0.75 days, due to having to stay on duty continuously and dealing with the shortage of medical teaching staff. These constituted important risk factors and corresponded to the study of the Medical Council of Thailand concerning the reasons medical students resigned. The first two reasons were from compensation issues and the burden of responsibility being too heavy during COVID-19 pandemic and in the future after they graduated. As for the length of time of clinical experience, if it was shortage, it indicated that medical students were likely to inadequate trustworthiness to perform treatment to the patients in service. They may not have confidence to make a decision to order medical treatment, the attending physician or medical teaching staff to think that they were ineffective in caring for the patients or they must take time to advise patients or futile care, and the risk of educational crisis occurred through department that had more work-loaded or imbalance between average number of patients to medical student ratio. Moreover, a feeling of quitting caring for a patients or feeling that they wanted to stop learning and resign from medical students within the past year, indicated that medical students were already at risk for educational crisis. The results indicated risk factors of medical students included poor sleep quality, little length of time of clinical experience, conflict with co-worker or teacher, feeling that they were unfit and inappropriate to be doctor and feeling that they wanted to stop learning and caring for patients, female gender, Covid-19

infection and resign from medical students within the past year. These seven factors increased the risk of educational crisis. The researcher reasoned that the causes may have been due to the need for close supervision by medical teaching staff, psychiatric consultant combination with multiple monitors and early prevention of mental health problems and psychological intervention should be regularly conducted for medical students during the COVID-19 pandemic. Other factors comprised coordinating with many medical teaching staff, emotional support for both medical students and their parents; these were probably reduced in prevalence of educational crisis. However, this study did not determine any specific cause. Investigators thought that close supervision by medical teaching staff, psychiatric consultant combination with multiple monitors, colleague's organizations, or adaptation of teaching systems played an important role in reducing educational crisis. This constituted the first study in Thailand to examine educational crisis in medical students. Risk factors for educational crisis were examined separately because their work-loaded, teaching system and health sciences system were not the same even in the college of medicine.

Strength of this study

This constituted the first study in Thailand to examine educational crisis in medical students. Research conducted in many public and university makes the data more diverse than that in a single institution. Multivariate analysis was performed for all variables in the study to determine the significant risk of developing educational crisis. However, this research was power to examine educational crisis in medical students. Although the questionnaire did not address the exact cause of educational crisis, but only stated that such factors involved a risk. In responding to questionnaires, response bias may have less occurred because they comprised personal data or were caused by total surveys the medical students to answer the questionnaire.

Limitations

This study has some limitations. First, nevertheless, this research was unable to determine the exact cause. Also, choosing medical students with selection bias may have influenced the findings. Second, studying additional medical students would be advisable before using the data in the future. This constituted the first study in Thailand to examine educational crisis in medical students. Third, risk factors for educational crisis were examined separately because their work-loaded, teaching system and health sciences system were not the same even in the college of medicine. Fourth, our results may be biased by over or under representation of educational crisis because we surveyed using personal contacts by simple random sampling. Fifth, risk factors for educational crisis may be greater than those the questionnaire proposed. Finally, the information was obtained from many college of medicine. Therefore, the applying the results in any college of medicine may be limited.

Conclusions:

In this study, we found a high prevalence of educational crisis among medical students. Co-independent risk factors for educational crisis were COVID-19 infection during study, female, duration of clinical experience, poor sleep quality, conflict with co-worker or teacher during study, feeling that they were unfit and inappropriate to be doctor and feeling that they wanted to stop learning and caring for patients and resign from medical students within the past year. During the COVID-19 pandemic, medical students had a much higher rate of depression. Early prevention of mental health problems and psychological intervention should be regularly conducted for medical students during the COVID-19 pandemic.

Declarations

Ethics approval and consent to participate:
Institutional Review Board Royal Thai Army Medical Department Ethics Committee approved this study on April 25, 2022. Research no.S017h/65 followed Council for International Organization of Medical Science (CIOMS) Guidelines 2012 and Good Clinical Practice of International Conference on Harmonization statement no.IRBRTA 0543/2565.

Consent for publication: not applicable

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflict of interests:

No potential conflict of interest relevant to this article was reported.

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Authors' contributions:

Study concept and design: P. Boontoterm, Thuncharoon, Fuengfoo. Acquisition of data: P. Boontoterm, Thuncharoon, Waealee, Witusurapot. Analysis and interpretation of data: P. Boontoterm, Thuncharoon, Fuengfoo.Drafting of the manuscript: P. Boontoterm, Waealee, Witusurapot. Critical revision of the manuscript for important intellectual content: P. Boontoterm, Thuncharoon, Fuengfoo. Statistical analysis: P. Boontoterm, Thuncharoon, Witusurapot. Administrative, technical, or material support: P. Boontoterm, Thuncharoon, Waealee, Witusurapot. Supervision: Fuengfoo.

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