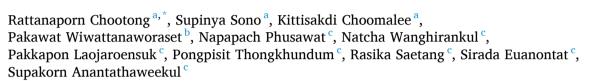Contents lists available at ScienceDirect

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Cross-sectional Study

The association between physical activity and prevalence of anxiety and depression in medical students during COVID-19 pandemic: A cross-sectional study

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ABSTRACT

Background: The COVID-19 pandemic has affected medical students both physically and mentally. Medical students have had to take online classes, which may have decreased their physical activity (PA) and increased their risk of mental health. This research aimed to explore the association between mental health problems and PA levels.

Materials and methods: A cross-sectional study was conducted on 1st–6th year medical students, at a university in Southern Thailand; from September to October 2021. The participants completed online questionnaires; including, demographic data, Global Physical Activity, PHQ-9 and the GAD-7 questionnaire. The association between PA levels and mental health was assessed using ordinal logistic regression.

Results: Among 325 medical students, 42.8% were males and 51.1% were clinical medical students. The prevalence of moderate to severe depression and anxiety was 31% and 12.9%. In total, 49.7% of participants had low PA levels. Pre-clinical students had a higher risk of depression (OR 2.11 p-value 0.001) and anxiety (OR 2.20 p-value 0.045) than clinical students. We also found that moderate or high PA levels were not a significant factor with mental health status (p-value of depression 0.447, 0.823 and p-value of anxiety 0.362, p-value 0.574, respectively).

Conclusion: There were a lot of medical students with moderate to severe depression and anxiety, and about half of those had low PA levels; especially, pre-clinical students that learned online study activities. There was no significant association between PA levels and mental health status. However, the faculty should reconsider their medical student to increase physical activities and redesign the curriculum to support their students during these challenging times.

1. Introduction

The Coronavirus disease, COVID-19, is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first outbreak was reported in late December 2019 in Wuhan, China [1]. Since then there have been more than 245,373,039 confirmed cases and 4,979,421 deaths globally [2]. (updated October 28th, 2021) In Thailand, the latest re-emerging, starting in April 2021, has been the

deadliest one of date, with a total of 1,893,941 confirmed cases and 19,070 deaths. [3] (updated October 24th, 2021).

This pandemic affected people's health as well as changing how people live, calling it the "new normal." People are required to wear masks, wash their hands regularly and keep physical distancing, while public spaces have been shut down [4]. People have been surrounded by devastating news concerning the outbreak, and not knowing when it will end. The government has encouraged businesses to work from home and

for schools to conduct online classes; causing people to undertake less physical activities (PA).

Physical activity is any movement produced by skeletal muscles that requires energy. For example, one metabolic equivalent (MET) equals the rate of energy used while sitting at rest. The World Health Organization (WHO) recommends people aged between 18 and 64 have 600 MET of PA per week to be considered physically active [5]. Those who have lower physical activities appear to have a higher all-cause mortality rate, cardiovascular disease, cancer, metabolic disorders and cognitive impairment [4].

Medical schools are known to be stressful environments, causing medical students to be at risk of facing mental health problems; such as depression and anxiety. A study showed that the prevalence of depression and anxiety among medical students was about one-third higher than the average population; especially in Asia [6,7]. During the pandemic, medical students not only had to adjust to the 'new normal', but were also forced to attend more online classes. Wattanapisit et al. (2016) revealed that more than half of the medical students were insufficiently active even before COVID-19 [8]. Additionally, many studies have shown the association between mental health status and PA level such as Puccinelli PJ et al. (2020) revealed that 30% of Brazilian population showed symptoms of moderate or severe depression, and 23.3% showed signs of moderate or severe anxiety during the COVID-19 pandemic, which were both associated with low levels of PA [9], A systematic review of Marconcin P et al. (2022) reported that higher physical activity is associated with higher quality of life, lower depressive and anxiety symptoms. [10].

The situation in the Faculty of Medicine in the Prince of Songkla University, where this study was conducted, was that the pre-clinical medical students were taking online classes, and although the clinical medical students rotated within the wards like before the outbreak there was a more restricted policy for social distancing. As of today, there have been only a small number of studies on the effects of PA during COVID-19, and mental health problems among medical students; especially in Thailand. According to this lack of research, we concerned that this study is highly beneficial in Thailand. Therefore, the primary purpose of this study was to explore the prevalence of depression, anxiety and the association between mental health problems and current PA levels in medical students during the COVID-19 pandemic.

Ultimately, the researchers hope that the results of this study would help the medical students, not only in the Prince of Songkla University, but also for other universities, during the pandemic of COVID-19. The advantage of the results will help people realize mental health problems among medical students, and could encourage the student affairs to create more suitable health promotion strategies; so as to prevent such problems and support the PA in medical students, leading a healthier mental and healthier life.

2. Material and methods

2.1. Study setting, design and population

This cross-sectional study was conducted in the Faculty of Medicine, Prince of Songkla University; from September to October 2021. The research included 1st to 6th year medical students, from the Faculty of Medicine, Prince of Songkla University, who were willing to participate in the questionnaires.

The Research was reported in line with STROCCS checklist and registered at www.researchregistry.com, with Research Registry UIN: researchregistry7503. Ethical approval was obtained from the Institutional Review Board, Faculty of Medicine, Prince of Songkla University.

The objective of this study was to analyze the association between depression, anxiety and PA levels. The sample size was calculated using a formula created by Walters et al. (2001) [11] for ordinal logistic regression. We assigned the value of alpha and beta 0.05 and 0.2, respectively. Other variables: ordinal odds ratio, pi-bar 1, pi-bar 2, and

pi-par 3 were calculated based on the prevalence of depression and anxiety of the previous research [12]. The calculation yielded a minimum number of 466 students as the sample size. However, to avoid incomplete data, we increased the sample size by 5%. As a result, the final value of the sample size was 490 students.

$$n_{Ordinal} = \frac{6\left[\left(Z_{1-\alpha/2} + Z_{1-\beta/2}\right)^2 \Big/ \left(\log OR_{Ordinal}\right)^2\right]}{\left[1 - \sum_{i=1}^{k} \overline{\pi}_j^3\right]}$$

$$\overline{\pi}_j = \frac{\overline{\pi}_{Aj} + \overline{\pi}_{Bj}}{2}$$

$\alpha = 0.05$, $\beta = 0.2$, $Z_{1-\alpha/2} = 1.96$, $Z_{1-\beta/2} = 0.842$

$OR_{Ordinal} = 2.3$, Pi-bar$_1$ = 0.595, Pi-bar$_2$ = 0.220, Pi-bar$_3$ = 0.185

2.2. Sampling technique

The study subject was sampled by a convenience sampling technique. The response rate of participants were 33%.

2.3. Questionnaire for assessment

The google form contained four sections. The first section collected general data regarding the participants' demographics: gender, age, weight, height, body mass index (BMI), GPAX, underlying disease, total family income, personal income/allowances, smoking and alcohol consumption habits.

The second section collected data required to assess participants' current PA levels, using the Thai version of the Global Physical Activity Questionnaire (GPAQ) [13] translated by the Department of Health Ministry of public health [14]. The range of Cronbach's alpha coefficients was 0.7293–0.8324 in each aspect of GPAQ. It covered several PA components; such, as intensity, duration and frequency. It assessed three domains, in which PA is performed; comprising of 16 questions regarding activity at work, travelling activities and recreational activities. One MET is defined as the energy cost of sitting quietly, it is equivalent to a caloric consumption of 1 kcal/kg/hour. Low, moderate and high PA were equal to <600, 600-1,500, and >1,500 MET-minutes/week, respectively. The WHO recommends people aged between 18 and 64 have at least 600 MET of PA per week to be considered physically active [15].

The third section collected data required to assess participants' depression status using the Thai version of the Nine-item Patient Health Questionnaire Screening (PHQ-9), which was translated by Manote Lotrakul and peers. Cronbach's alpha of the Thai version of the PHQ-9 was 0.79 [16]. It contained nine questions related to symptoms of major depressive disorder (MDD), according to DSM-5. Each question had four levels to rate symptoms frequency over the last two weeks: not at all, several days, more than half the days and nearly every day. Depression severity was: no or minimal (score 0–4), mild (score 5–8), moderate (score 9–14), moderately severe (score 15–19), severe (score 20–27).

The fourth section collected data required to assess participants' anxiety status using the Thai version of the 7-item Generalized Anxiety Disorder (GAD-7). The sensitivity and specificity of this questionnaire were 0.89 and 0.82 [17,18]. The questionnaire asked participants how often they had been bothered by problems over the last two weeks. Each question had four levels to rate symptoms frequency: not at all, several days, more than half the days, and nearly every day. Anxiety severity was: low (score 0–9), moderate (score 10–14) and severe (score 15–21).

2.4. Data collection

This study was managed using online platforms. The Google Forms were distributed through Line, a social network application commonly used among the students. Researchers endeavor stimulating responses to questionnaires notifying via LINE application program every 2 weeks. The duration of questionnaire response is determined in 2 months. The data collected was then saved from Google Forms into Microsoft Excel. Therefore, the participant's information sheet was on the first page of the questionnaire. The participants could freely enroll or reject the study.

2.5. Data analysis

The data was analyzed using R program, version 4.1.0. Descriptive data are presented in mean and standard deviation; median with IQR or percentage depending on the data distribution. Analysis compared the differences of factors in categorical data by Wilcoxon's rank-sum or Kruskal-Wallis test. Chi-squared or Fisher's exact test was used to compare proportion between categorical variables. The association between PA level and mental health was assessed using ordinal logistic regression. The significance level was determined as 0.05.

3. Results

The 325 participants included 186 females and 139 males. Among these samples, 159 participants (48.9%) were pre-clinical medical students. There were 45 (13.9%) obese participants, 13 (8.20%) in the pre-clinical year, and 32 (19.3%) in the clinical year. The median age of participants was 21 (3) years. The median GPAX was 3.5 (0.5). There were 54 (16.6%) participants who had an underlying disease, most of which was allergy, followed by asthma and polycystic ovary syndrome (PCOS). There were 29 (8.9%) participants who had a pre-existing mental illness. Most of these were major depressive disorder (MDD), followed by adjustment disorder and obsessive-compulsive disorder (OCD). Most of their household income was 924–2,156 USD per month, and their allowance was mainly less than 462 USD per month. Their parent's education was mainly bachelor's degree. Most of them had never smoked, nor had ever drank alcohol (Table 1).

Table 2 demonstrated the prevalence of depression and anxiety levels among the participants. Pre-clinical medical students presented higher moderate to severe levels of depression and anxiety when compared to clinical medical students (p-value 0.041 and < 0.001 for depression and anxiety, respectively). It was observed that 61 (38.3%) pre-clinical medical students and 40 (24.1%) clinical medical students had moderate to severe depression levels. In the anxiety domain, 28 (17.6%) pre-clinical medical students and 14 (8.4%) clinical medical students showed moderate to severe anxiety levels.

Table 3 identified the prevalence of PA among the participants. Most of the participants had low PA levels (<600 MET-minutes/week) (49.7%), followed by a moderate level (600–1500 MET-minutes/week) (29.8%) and a high level (>1500 MET-minutes/week) (20.5%). There were significant differences in PA in pre-clinical and clinical medical students. Most of the pre-clinical medical students were physically inactive (<600 MET-minutes/week) (56.6%), while the clinical medical students were physically active (≥600 MET-minutes/week) (57.1%) (p-value 0.019). The median overall MET score (IQR) was 600 (1,190). The overall MET score in the pre-clinical year and clinic year were 360 (1,160) and 680 (1,168), respectively (p-value 0.004).

Table 4 showed the association between participant's factors and mental health status. The factors significantly associated with depression and anxiety were levels of education and pre-existing mental illness. Pre-clinical medical students had a higher risk of depression (OR 2.11, p-value 0.001) and anxiety (OR 2.20, p-value 0.045) than clinical medical students. Also, pre-existing mental illness increased the risk of depression (OR 2.81, p-value 0.008) and anxiety (OR 3.63, p-value 0.013). On

Table 1
Characteristics of participants.

Variables	Total (n = 325)	Pre-Clinic (n = 159)	Clinic (n = 166)	p-value
Gender, n (%)				0.005*
Male	139 (42.8)	55 (34.6)	84 (50.6)	
Female	186 (57.2)	104 (65.4)	82 (49.4)	
Age (year), Median (IQR)	21 (3)	20 (1)	23 (1)	<0.001**
BMI, n (%) ****				0.006*
<25 kg/m^2	280 (86.1)	146 (91.8)	134 (80.7)	
≥25 kg/m^2	45 (13.9)	13 (8.2)	32 (19.3)	
GPAX, Median (IQR)	3.5 (0.5)	3.7 (0.4)	3.3 (0.4)	<0.001**
Underlying disease, n (%)				0.078*
No	271 (83.4)	139 (87.4)	132 (79.5)	
Yes	54 (16.6)	20 (12.6)	34 (20.5)	
Allergy	37 (68.5)	15 (75)	22 (64.7)	
Asthma	4 (7.4)	1 (5)	3 (8.8)	
PCOS	3 (5.6)	0	3 (8.8)	
Others	10 (18.5)	4 (20)	6 (17.7)	
Pre-existing mental illness, n (%)				<0.001*
No	296 (91.1)	154 (96.9)	142 (85.5)	
Yes	29 (8.9)	5 (3.1)	24 (14.5)	
MDD	15 (51.7)	3 (60)	11 (45.8)	
Adjustment disorder	7 (24.2)	1 (20)	6 (25)	
OCD	3 (10.3)	1 (20)	2 (8.3)	
Others	4 (13.8)	0	5 (20.9)	
Household income (USD/month), n (%)				0.124*
≤ 924	68 (20.9)	39 (24.5)	29 (17.5)	
924–2,156	143 (44)	72 (45.3)	71 (42.8)	
> 2,156	114 (35.1)	48 (30.2)	66 (39.8)	
Allowance (USD/month), n (%)				0.012***
≤ 462	305 (93.9)	155 (97.5)	150 (90.4)	
462–1,078	19 (5.8)	4 (2.5)	15 (9.0)	
> 1,078	1 (0.3)	0	1 (0.6)	
Education of parents, n (%)				
Father				0.044***
Undergraduate	105 (32.7)	62 (39.7)	43 (26.1)	
Bachelor's degree	158 (49.2)	66 (42.3)	92 (55.7)	
Master's degree	50 (15.6)	25 (16)	25 (15.2)	
Doctoral degree	8 (2.5)	3 (2)	5 (3)	
Mother				0.145***
Undergraduate	90 (27.9)	53 (33.8)	37 (22.3)	
Bachelor's degree	189 (58.5)	84 (53.5)	105 (63.3)	
Master's degree	39 (12.1)	18 (11.4)	21 (12.6)	
Doctoral degree	5 (1.5)	2 (1.3)	3 (1.8)	
Smoking, n (%)				<0.001***
Never	295 (90.8)	154 (96.9)	141 (84.9)	
Ex-smoker	26 (8)	5 (3.1)	21 (12.7)	
Current	4 (1.2)	0	4 (2.4)	
Alcohol drinking, n (%)				0.017*
Never	134 (41.2)	77 (48.4)	57 (34.3)	
Ex-drinker	133 (40.9)	61 (38.4)	72 (43.4)	
Current	58 (17.9)	21 (13.2)	37 (22.3)	

Data are expressed as the median (IQR) or the number (%). USD= United States dollar.

IQR = interquartile range, BMI=Body Mass Index, kg = kilogram, m = metre, GPAX = cumulative grade point average, n = number.

PCOS = polycystic ovary syndrome, MDD = major depressive disorder, OCD = obsessive compulsive disorder*p-value by Chi-squared test, **p-value by

Wilcoxon Rank sum test, ***p-value by Fisher's exact te st.

****We divided subjects into two groups (Obese patients from WPRO criteria [19], BMI $\geq$25.0 kg/m^2, and non-obese patients, BMI <25 kg/m^2).

Table 2
Mental health status of participants.

		Total (n = 325)	Pre-Clinic (n = 159)	Clinic (n = 166)	p-value
Depression n (%)	No or minimal	126 (38.8)	50 (31.4)	76 (45.8)	0.041*
	Mild	98 (30.2)	48 (30.3)	50 (30.1)	
	Moderate	69 (21.2)	43 (27)	26 (15.7)	
	Moderately severe	20 (6.2)	11 (6.9)	9 (5.4)	
	Severe	12 (3.6)	7 (4.4)	5 (3)	
Anxiety n (%)	Mild	283 (87.1)	131 (82.4)	152 (91.6)	<0.001*
	Moderate	30 (9.2)	25 (15.7)	5 (3)	
	Severe	12 (3.7)	3 (1.9)	9 (5.4)	

n, number *p-value by Chi-squared test.

Table 3
Physical activity levels of participants.

	Total (n = 322)	Pre-Clinic (n = 159)	Clinic (n = 163)	p-value
Physical activity levels, n (%)				0.048*
Low	160 (49.7)	90 (56.6)	70 (42.9)	
Moderate	96 (29.8)	40 (25.2)	56 (34.4)	
High	66 (20.5)	29 (18.2)	37 (22.7)	
Physical activity, n (%)				0.019*
Active	162 (50.3)	69 (43.4)	93 (57.1)	
Inactive	160 (49.7)	90 (56.6)	70 (42.9)	
Overall MET score, Median (IQR)	600 (1,190)	360 (1,160)	680 (1,168)	0.004**

n = number; MET = metabolic equivalents, IQR = interquartile range *p-value by Chi-squared test, **p-value by Wilcoxon Rank sum test.

the other hand, we found that moderate or high PA levels were not a significant factor with mental health status (p-value of depression 0.447, 0.823 and p-value of anxiety 0.362, p-value 0.574, respectively).

4. Discussion

The COVID-19 pandemic has affected medical students both physically and mentally. Medical students have had to attend online classes, which could have lead to frustration and might have decreased their PA. This study was to explore the prevalence of depression, anxiety and the association between mental health problems and current PA levels in medical students during the COVID-19 pandemic. The main findings of this research were: (I) 12.9% and 31% of the medical students had moderate to severe anxiety and depression, (II) pre-clinical students presented higher moderate to severe levels of depression and anxiety when compared to clinical students, (III) 49.7% of the medical students had low PA levels (< 600 MET-minutes/week), (IV) pre-clinical medical students were physically inactive than clinical medical students, (V) factors associated with depression and anxiety were levels of education and pre-existing mental illness, (VI) PA levels factor (moderate or high levels) were not associated with mental health status.

Our findings indicated that 12.9% and 31% of the medical students had moderate to severe anxiety and depression, respectively. This is inconsistent with the study conducted in China by Xiao et al., in 2020 [20], which found the prevalence of anxiety and depression in medical students to be 4.6% and 7.6%, respectively. This may be due to the fact that during this study period, there was a severe outbreak of the Coronavirus in Thailand. Alternatively, it could be described by a study of Pramukti et al. (2020) [21], which suggested that the reasons for a high anxiety prevalence, among Thai medical students, consisted of the lack of confidence in pandemic controls, and COVID-19 information received from unofficial sources. However, other factors could affect medical students' mental status rather than the pandemic.

The result of PA levels in medical students was that, 49.7% of medical students had low PA levels; otherwise called being physically inactive. This study also found significant differences between physical activity in pre-clinical and clinical medical students. Most of the pre-clinical medical students were physically inactive while the clinical medical students were physically active (p-value 0.019). This might be because the pre-clinical medical students were still attending online classes; whereas, the clinical medical students had already returned to normal ward rotations.

The results from ordinal logistic regression of factors associated between participant's factors and mental health status were inconsistent with the study by Puccinelli PJ et al. [9] Our study found that there are only two factors that were significantly associated with anxiety and depression: level of educations and pre-existing mental illness. The pre-clinical medical students had a higher risk of depression (OR 2.11) and anxiety (OR 2.20) than clinical medical students, which was consistent with a previous study regarding the prevalence of anxiety and depression among medical student during the COVID-19 pandemic in the USA [22]. This may be because the pre-clinical medical students had a longer online study period; thus, higher stress from the online exam, and more at-home distractions than the clinical medical students. Also,

Table 4
Ordinal logistic regression of factors associated between participant's factors and mental health status.

Factor	Depression			Anxiety		
	Crude OR (95%CI)	Adjusted OR (95%CI)	p-value	Crude OR (95%CI)	Adjusted OR (95%CI)	p-value
Gender (Ref: male)						
Female	1.54 (1.02,2.32)	1.36 (0.88,2.10)	0.163	2.58 (1.26,5.72)	1.94 (0.91,4.43)	0.101
Level of education (Ref: clinic)						
Pre-clinic	1.97 (1.31,2.96)	2.11 (1.37,3.27)	**0.001**	2.32 (1.18,4.80)	2.20 (1.04,4.89)	**0.045**
BMI (Ref: < 25 kg/m^2)						
$\geq$ 25 kg/m^2	0.85 (0.47,1.50)	0.91 (0.50,1.66)	0.767	0.46 (0.11,1.34)	0.57 (0.13,1.81)	0.393
Underlying diseases (Ref: no)						
Yes	1.26 (0.74,2.14)	1.34 (0.77,2.33)	0.305	0.71 (0.23,1.75)	0.73 (0.23,1.94)	0.557
Pre-existing mental illness (Ref: no)						
Yes	2.18 (1.06,4.51)	2.81 (1.31,6.04)	**0.008**	2.48 (0.92,5.97)	3.63 (1.26,9.77)	**0.013**
Physical activity levels (Ref: Low)						
Moderate	0.71 (0.45,1.13)	0.83 (0.51,1.34)	0.447	0.56 (0.24,1.21)	0.68 (0.28,1.52)	0.362
High	0.79 (0.46,1.34)	0.94 (0.54,1.62)	0.823	0.63 (0.24,1.46)	0.77 (0.28,1.86)	0.574

OR = odds ratio, 95% CI = 95% confidence interval, Ref. = reference, BMI = body mass index, kg = kilogram, m = metre.
Bold values indicate statistical significance at p < 0.05.

they have less time with friends, medical school experiences, adjustment abilities, knowledge, and understanding of COVID-19 than clinical medical students.

Another factor that was significantly associated with the prevalence of anxiety and depression levels in this study was pre-existing mental illness (MDD, adjustment disorder and OCD). The results of our study revealed that the participants who had a pre-existing mental illness had significantly increased levels of depression and anxiety. It has been well documented that depression and anxiety can lead to many negative consequences [23]. Due to poor coping skills and lack of resilience, they had poor ability to adapt to difficult situations, and were more emotionally fragile. The medical education curriculum, its organization, tight schedule, frequent high-stake examinations, competitive environment and persistent relationship problems created and maintained high levels of stress, especially during the COVID-19 pandemic. These difficulties added a high level of stress to the vulnerable students. Finally, there was no significant association between PA levels and mental health status.

4.1. Strengths of the study

This research occurred during the COVID-19 period. Data were collected from medical students in Thailand, for which there is a limited number of studies. Nevertheless, it shows arising problems in the study group, and can be helpful for faculties and universities to deal with the going-on pandemic. In addition, data were collected among both pre-clinical and clinical medical students whose teaching patterns are different. Moreover, it shows whether the online teaching activities had any effect on the physical activity levels and the student's mental health status or not.

4.2. Limitations

We thought that there was a limitation due to there being no baseline data on the prevalence of depression and anxiety in the medical school of the Prince of Songkla University before the COVID-19 pandemic; resulting in a lack of information to compare mental health situations between the two periods. Furthermore, each medical school has different norms, environments and curriculums that could lead to different results in the prevalence of depression, anxiety and physical activity. Therefore, this could affect the implication of this study.

An inadequate number of participants might not have allowed the results to reach the proper theoretical saturation of the relation between physical activity and mental health. The responses rate was approximately 33 percent, as an online questionnaire was the only data collection tool we used. Although we decided to prolong the study time from 1 month to 2 months, the problem still could not be solved. Recall bias might have occurred because some of the questionnaires required the participants to state the conditions that were present for the past two weeks. Convenience samplings may lead to selection bias which recognized as preconception data.

4.3. Suggestion

Many other factors could predispose a medical student to anxiety or depression that could not be assessed due to the wide variability of factors examined in this study; including, curriculum factors or academic pressure, which should be further studied in the future.

5. Conclusion

Amidst the COVID-19 pandemic, there were a lot of medical students with moderate to severe depression and anxiety, and about half of those had low PA levels; especially, pre-clinical students that learned online study activities. The factors that were associated with depression and anxiety were level of education and pre-existing mental illness status.

There was no significant association between PA levels and mental health status. However, the faculty should reconsiderate their medical student to increase physical activities and redesign the curriculum to support their students during these challenging times.

Ethics approval

This study was approved by the Prince of Songkla university Institutional Review Board, Faculty of Medicine, Songklanagarind Hospital, Prince of Songkla University (IRB number EC 64-336-9-1).

Author contributions

Rattanaporn Chootong: writing study concept, methodology, data analysis and writing the paper- Pakawat Wiwattanaworaset: Writing study concept- Supinya Sono: writing the paper- Kittisakdi Choomalee: data analysis- Napapach Phusawat, Natcha Wanghirankul, Pakkapon Laojaroensuk, Pongpisit Thongkhundum, Rasika Saetang, Sirada Euanontat, Supakorn Anantathaweekul: data collection, data analysis and writing the paper. All authors have read and approved the final manuscript.

Declaration of competing interest

The authors report no conflict of interest in this study.

Registration of research studies

1. Name of the registry: http://www.researchregistry.com.
2. Unique Identifying number or registration ID: researchregistry 7503.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): https://www.researchregistry.com/register-now#home/registrationdetails/61d0425d26f88f001f083378/

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Provenance and peer review

Not commissioned, externally peer reviewed.

Consent

This study was managed using online platforms. Therefore, the participant information sheet was on the first page of the questionnaire. The participants could freely enroll or reject the study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.103408.

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