

## Academic Stress in Medical Students during 3 Different States: Holiday, Lecture, and Exams

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Stress is not only experienced by people who have worked, but it is not uncommon for students. Knowing the existence of stress and the severity of stress on someone is very important. The study aims to determine the difference in stress levels (academic stress) for students at various pre-clinic levels at Udayana University in 2020. An observational analytic design drives the samples from the 1st – 4th academic year students of Udayana University to take stress index and diagnosis questionnaires. The stressor condition was analyzed differently during holidays, lectures, or examinations. The 384 participants aged  $19.46 \pm 1.28$  years old consisted of 197 females and 187 males. Dominantly, the males had the highest number of severe ASI, RCS, QN, QL, and SR. The academic stress significantly differed in each batch ( $p < 0.05$ ), except for SR. The academic conditions appeared significant mean differences among ASI, QN, and QL. The significant conspicuous data appeared between the 3rd and 4th year for almost all stress variables, and also between lecture and exam time for both QN and QL. Different varieties of academic stress are shown early on in pre-clinical students, not only in the real clinical field. The low to severe grade at each stress variable was significant to be considered within the academic situation.

**Keywords:** Academic students; Stress questionnaire; Work stress.

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The academic developments that followed the progress of science and technology still did not reduce human problems. The development of science and technology even causes more complex problems. Of the many problems faced, not a few cases cause stress, as well as those raised by the individual concerned, family, the environment/community, work, and tasks that are burdensome and charged to him.

Stress is not only experienced by people who have worked, but it is not uncommon for

students. The stress experienced by students is known as academic stress. This stress arises due to the large academic burden that includes many learning materials, independent tasks that must be completed in a short time, the short time between mastering the material with the examination, the difficulty of dividing time for learning and extracurricular activities, facing examinations, and changing ways learning compared to during high school, especially in first semester students who have not adapted. Stress when facing an exam is a good example of student mental stress.<sup>1</sup>

A person's stress level varies depending on how someone responds and solves the problem and the ability to deal with the problem. The existence of stress will greatly affect the performance and productivity of a person who, if unable to overcome it, will impact dropout. People who experience severe stress will certainly reduce their performance and work productivity even if the stress lasts longer it can result in the emergence of an illness.<sup>2</sup> Ascobat Gani, in his report, stated that in Indonesia, around 50 million people experience mental disorders. This figure is based on WHO estimates that one in four people suffer from mental disorders. And this will result in the patient's income will be lost, and funds for medical expenses will be spent a lot. In addition, productive work time will also be lost.<sup>3</sup> The effects of stress can indeed have an impact on two different things. In one case, stress can spur productivity/achievement as long as the stress level can be overcome. On the other hand, it will lead to frustration, depression, and decreased productivity/achievement if the stress level exceeds the ability of someone to overcome it.<sup>4</sup>

The presence of mental stress activates the hypothalamic-pituitary-adrenocortical (HPA) axis, which starts from stimulation of the hypothalamus to secrete an adrenocorticotrophic hormone-releasing hormone (ACTH-RH), which activates the anterior pituitary to secrete Adrenocorticotrophic Hormone (ACTH).<sup>5</sup> ACTH which is secreted will stimulate the adrenal cortex to secrete cortisol which affects the metabolism of carbohydrates, fats, and proteins.<sup>6</sup> If elevated cortisol levels over a long period will harm health.<sup>7</sup> Physical response to stressed individuals is characterized by increased heart rate, increased respiratory frequency, increased muscle tension, and if long-lasting, often causes cardiovascular diseases, such as myocardial infarction, hypertension, etc.<sup>8</sup> Psychologically, the worker looks tense, anxious, has a fight and flight response. High levels of stress are also often associated with absenteeism.

The last study in India mentioned that the students were affected by academic stress (53%) and were found to be more morbid in the 5<sup>th</sup> semester rather than the 2<sup>nd</sup> semester.<sup>9</sup> In Pakistan, academic and psychosocial concerns contributed to the most common sources of stress but showed an insignificant correlation between perceived stress and academic performance.<sup>10</sup> Females reported

higher scores than their males.<sup>9</sup> On the other hand, distress amongst medical students outside North America is substantially high, nearly 97%.<sup>11</sup> Even in Surya, a conflict war area, Syrian medical students suffer high rates of psychological distress. Females, second-year students, and those with "insufficient" personal income were the most affected.<sup>12</sup> Based on a study in Finland, the stress factors were grouped into relationship, environmental, academic, and personal factors. Worries about the future were the main factor causing stress among students, whereas class workload was the main element of stress regarding academic factors.<sup>13</sup>

Indonesia itself has many academic institutions for pre-clinical students year by year. According to their academic stress, some performed student quality within the scientific publication. Students who experience academic stress have a maladaptive perception of academic demands.<sup>14</sup> The study by Kloping *et al.*, in 2020 evaluated 1,792 students from 29 Indonesian medical institutions, except Udayana University, about academic stress or conditions faced by preclinical cross-sectionally.<sup>15</sup> It revealed a dysequilibrium of academic stress faced by students in different regions with multiple factors. A high prevalence of academic stress among Indonesian medical students needs more attention and calls for special intervention from the unit of guidance and counseling services.<sup>16</sup>

Knowing the existence of stress and the severity of stress on someone is very important. One method that can be used to determine stress levels is a stress diagnosis questionnaire, a standard questionnaire validated by the Ministry of Health of the Republic of Indonesia.<sup>17</sup> Knowing the stress level and whether there are differences in stress levels from year to year in students, especially in the Medical Faculty of Udayana University, can provide input for the management to take a stand on it.

## METHODS

The study was an observational analytic design conducted at the Faculty of Medicine, Udayana University, from September to December 2020. The study proposal had ethical clearance number 1654/UN14.2.2.VII.14/LT/2020 released by Ethical Committee, Faculty of Medicine of

Udayana University. The population of this study was the Medical Faculty of Udayana University students. The sample size in this study was a minimum of 10% of the number of students per level, and then to facilitate the implementation, a sample of 96 people was taken for each level. The determination of respondents was conducted by using a list of students from the academic year I-IV as a sampling frame. We conducted stratified sampling for 800 students within our institutions. Then the inclusion criteria were determined, including those students who were in a healthy condition (not in serious physical illness), aged 16-24 years, had no family problems that interfered with teaching and learning activities, and were willing to participate in this study. The student level is the year students have undergone education in the faculty (1st, 2nd, 3rd, and 4th year) at the research time. The condition of the stressor is taken, whether during holidays, lectures, or examinations.

The level of stress (academic stress) is the severity of stress experienced by students assessed based on the stress index and diagnosis questionnaire, which is the national questionnaire developed by the Ministry of Health of the Republic of Indonesia in 2006 through eligible validation and reliability. Respondents determined by simple random sampling and fulfilling the inclusion criteria were asked to fill in the questionnaire. The questionnaires were filled out on the subject three times, namely during holidays, while attending classes, and when the exam was given. Respondents chose one value on a Likert scale of 1 – 7 for each statement according to the choice that was considered the most appropriate to assess the condition as a source of stress. Those seven options describe the condition as never, very rarely, rarely, sometimes, often, very often, or always causing stress. The next assessment is to add up all the values for each work stressor statement and then put it in a category. Categories consist of a total score < 10 as a low-stress degree, 10 – 24 belonging to a moderate stress degree, or a high-stress degree for a total score greater than 24. The categories involved in each type of academic stress consist of stress index (SI), ambiguity stress index (ASI), role conflict stress (RCS), quantitative stress (QN), qualitative stress (QL), career development stress (CD), and responsibility stress (SR).

We hypothesized the mean values among

three academic conditions were differed, and so were the four batches. We applied SPSS IBM version 25.0 to manage data statistically. Then, we built graphs using GraphPrism v.8.0.2. The data were then analyzed by chi-square to obtain an association among stress levels in each gender. Furthermore, we applied the Kruskal-Wallis test to compare the mean of all academic stress during holidays, lectures, and exams for each level of students. The significance of the data is on p-value < 0.05.

## RESULTS

The study involved 384 total participants from the academic years I, II, III, and IV. They had an average age of about  $19.46 \pm 1.28$  years old, between 16 – 24 years (Table 1). The number of female participants was higher than males in the academic year's side. Both genders seem to have a few number differences in each condition. However, the females still participated mostly in the study.

As shown in Figure 1, all types of academic stress presented a significant association among mild, moderate, and severe stress levels in each gender ( $p < 0.05$ ). However, the stress index indicated its association between moderate and severe stress levels only. The statistic for SI confirmed that 75% of males had moderate levels against females (25%). The remaining 54.4% of males signed them as severe SI, and the female had 45.6%. The unique symbols of the illustration performed that ASI, RCS, QN, and QL had narrow values which were close to each other. The males had the highest number of severe ASI (51.5%), severe RCS (66.7%), and severe QN (50.9%). On the other hand, the females dominated the highest data for severe QL (61.3%). The next conspicuous number appeared on CS data. The females constitute the most participants who had mild severity experiencing CS (83.3%), although they had higher severe number above 55% than the male participants. At least, related to responsibility stress product, above 70% of males indicated that most participants had severe SR, and the females contributed the most moderate SR criteria.

The academic year offered distinguishable mean differences for each productive stress type (Figure 2). Ambiguity stress ( $p = 0.012$ ), role

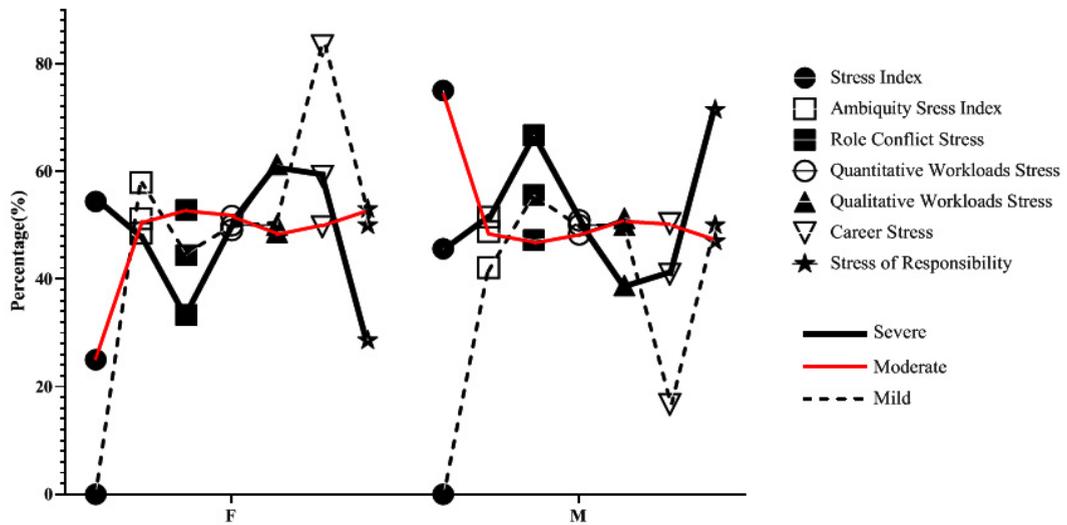
conflict stress ( $p=0.001$ ), quantitative workload stress ( $p=0.019$ ), qualitative work stress ( $p=0.001$ ), and stress on career development ( $p=0.022$ ) were significantly different in each academic year. The mean difference in stress index related to academic

years found no significant value, as well as even among academic conditions. The responsible stress also had no significant mean difference between academic years or conditions.

**Table 1.** Characteristics of participants based on academic year and condition

Academic year	Conditions	Mean Age $\pm$ SD	N	N Male (%)	N Female (%)
I	Off-campus	17.88 $\pm$ 0.56	32	17 (53.1)	15 (46.9)
	On-campus	18.16 $\pm$ 0.45	32	16 (50)	16 (50)
	Exam	18.16 $\pm$ 0.52	32	12 (37.5)	20 (62.5)
	Total	18.06 $\pm$ 0.52	96	45 (46.9)	51 (53.1)
II	Off-campus	18.69 $\pm$ 0.99	32	16 (50)	16 (50)
	On-campus	19.03 $\pm$ 0.59	32	17 (53.1)	15 (46.9)
	Exam	18.72 $\pm$ 0.58	32	16 (50)	16 (50)
	Total	18.81 $\pm$ 0.76	96	49 (51)	47 (49)
III	Off-campus	20.00 $\pm$ 0.72	32	16 (50)	16 (50)
	On-campus	19.94 $\pm$ 0.62	32	12 (37.5)	20 (62.5)
	Exam	19.91 $\pm$ 0.59	32	16 (50)	16 (50)
	Total	19.96 $\pm$ 0.64	96	44 (45.8)	52 (54.2)
IV	Off-campus	20.88 $\pm$ 0.56	32	15 (46.9)	17 (53.1)
	On-campus	21.13 $\pm$ 0.71	32	17 (53.1)	15 (46.9)
	Exam	21.00 $\pm$ 0.44	32	17 (53.1)	15 (46.9)
	Total	21.00 $\pm$ 0.58	96	49 (51)	47 (49)
Total	Off-campus	19.36 $\pm$ 1.37	128	64 (50)	64 (50)
	On-campus	19.56 $\pm$ 1.25	128	62 (48.4)	66 (51.6)
	Exam	19.45 $\pm$ 1.22	128	61 (47.7)	67 (52.3)
	Total	19.46 $\pm$ 1.28	384	187 (48.7)	197 (51.3)

Note: SD, the standard of deviation; N: number of subjects



**Fig. 1.** All types of academic stress share percentage data among mild, moderate, and severe stress levels in each gender. Note: M: male; F: female

After sorting the data, it presented only the QL stress which had a significant Mann-Whitney test between the earliest batches ( $p=0.006$ ) and also between the first and the fourth batch ( $p=0.048$ ). The next post-hoc data between the first and the third batch produced three significant mean values on ASI, RCS, and QN ( $p=0.002$ ;  $p<0.001$ ;  $p=0.027$ , respectively). The next data appeared three significant mean values on RCS ( $p=0.004$ ), QN ( $p=0.005$ ), and QL ( $p=0.001$ ) in the middle years (second and third). None of them had significant mean values between the second and the fourth academic year. The final mean comparison between the third and the fourth batch indicated there were significant Mann-Whitney to the eligible data on the whole (ASI, RCS, QN, and QL with  $p\text{-value} < 0.05$ ).

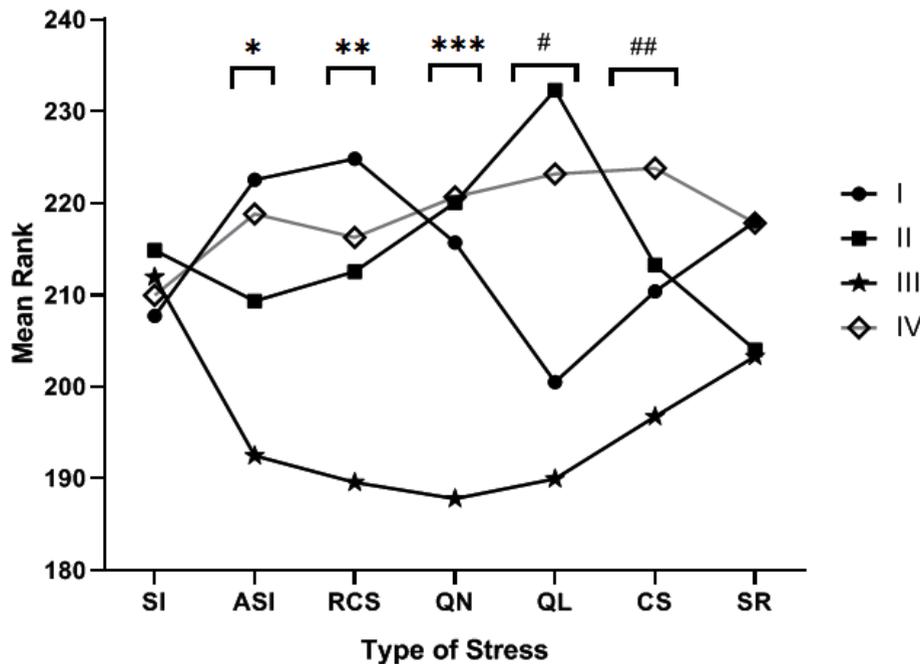
Regarding academic situations (Figure 3), by the Kruskal-Wallis test, there were also no significant mean differences in the role conflict stress, career stress, and stress of responsibility in each academic condition. On the other side, there were mean differences significantly in ASI, QN,

and QL among holiday, lecture, and exam phases ( $p=0.050$ ;  $p=0.028$ ;  $p=0.001$ , respectively).

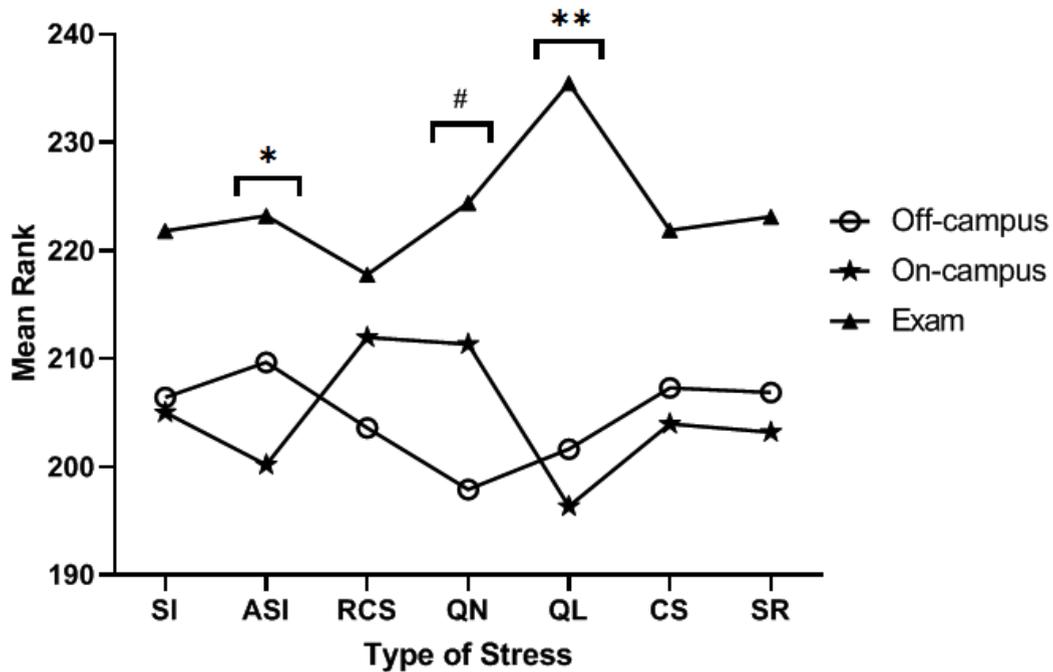
The post-hoc test was then performed there were no significant mean values on those ASI, QN, and QL data ( $p=0.275$ ;  $p=0.082$ ;  $p=0.584$ , respectively) between holiday and lecture time. Exactly, the statistic between off-campus and exam conditions showed equal  $p$ -value for both QN and QL (0.08, respectively). However, the conditions between lecture and exam presented both ASI and QL had significant Mann-Whitney data ( $p=0.022$  and  $p=0.001$ , respectively) than QN ( $p=0.361$ ).

### DISCUSSION

Developments in technology affect all aspects of educational strategies, from who or what performs the tasks, how and where tasks were performed, were organized and the terms of its performance, and the ergonomic benefit.<sup>18</sup> Academic stress has been identified as the primary cause of these alarming figures. The stress as an interaction between environmental



**Fig. 2.** The academic years reflect significant differences in each type of academic stress, except for stress index and responsibility stress. Note: significant at  $p\text{-value} < 0.05$  on Kruskal-Wallis test; \* $p=0.012$ ; \*\* $p<0.001$ ; \*\*\* $p=0.019$ ; # $p=0.001$ ; ## $p=0.022$ . SI: stress index; ASI: ambiguity stress index; RCS: role conflict stress; QN: quantitative stress; QL: qualitative stress; CS: career stress; SR: responsibility stress



**Fig. 3.** The academic conditions significantly contribute to mean differences among ambiguity stress index, quantitative, and qualitative stress. Note: significant at  $p$ -value  $< 0.05$  on Kruskal-Wallis test; \* $p=0.050$ ; # $p=0.028$ ; \*\* $p<0.001$ . SI: stress index; ASI: ambiguity stress index; RCS: role conflict stress; QN: quantitative stress; QL: qualitative stress; CS: career stress; SR: responsibility stress

stressors, students' appraisal, and their reactions becomes a significant cause of concern as it is symptomatic of rising mental health concerns in the campus environment.<sup>1</sup> When college students face excessive or negative stress, they experience physical and psychological problems. Excessive stress modulates health difficulties in the form of fatigue, loss of appetite, headaches, and gastrointestinal case. Academic stress has contributed to a range of negative effects, including illness, anxiety, depression, and poor academic performance.<sup>19</sup>

The present study illustrated that female participants were the large number of subjects contributing a range of results within our research. A previous study in 2021 realized that females indicated higher levels of stress than males. Gender differences were evident in specific coping strategies used. Females were found to utilize the emotion-focused coping dimension and endorsed the use of four coping strategies more often than males. These included self-distraction, emotional support, instrumental support, and venting.<sup>20</sup>

Our present study also performed the males had the highest number of severe ASI, RCS, and QN approximately above 50% than females. In addition, above 70% of males indicated severe SR. On the contrary, the females declared mild levels of CS than males. The ability in collaborating with their coping mechanism to reduce academic stress will differ year by year in certain conditions.

In this study, ambiguity stress and role conflict stress have statistically significant mean differences in each academic year. At the same time, the mean ambiguity stress is also significantly different in all three conditions. Ram *et al.* study in 2011 revealed that role ambiguity and conflict were positively and strongly related to work stress.<sup>21</sup> According to Wibowo in 2019, role conflict is an emotional appearance arising from the demands and inability of somebody to complete their work. Role conflict occurs when students do not meet to do certain assignments. Role conflict can affect academic stress and can make students feel weak when there are at least two negative factors. The characteristics of role conflict involve doing

unnecessary tasks, being between two or more different vertical or horizontal conflicts of interest, doing something which is only accepted by one party, or facing a situation when the instruction line in the environment is not obeyed.<sup>22</sup>

The positive impact of ambiguity is that it can push individuals' ability to work and complete comprehensive tasks and create a more disciplined agenda. While the negative side that arises as a result of role conflict and ambiguity situations is job stress, lower job satisfaction, weak organizational commitment, resigning from jobs, lower productivity, enhanced tension, dissatisfaction, and psychological withdrawal from the campus.<sup>22</sup> A narrative review in 2019 revealed that students commonly report severe levels of academic-related stress that impacted their mental and physical health and leads to a range of academic problems. Well-stress-management skills induced the benefit potency throughout their lives, long-term health-related behaviours, and then established during adolescence and early adulthood.<sup>23</sup> Prevalence of academic stress is not a stream-specific situation. Moderate to severe levels were reported in medical and engineering students implicating the need for medical or ergonomic attention and interventions.<sup>1</sup>

In addition, in the last research about qualitative workload, male researchers had higher levels of qualitative overload. Adapted child aptitude, representing obedience, was lower in male researchers. Lack of supervisor support was positively associated with qualitative overload, and nurturing parent ego aptitude was negatively associated with it.<sup>24</sup> The previous study shows that workload-related stress significantly influences students' effectiveness in terms of publication, community service, and learning effectiveness.<sup>25,26</sup> Others recommend that interventions to eliminate or reduce occupational stress should be both at organizational and individual levels. Ongoing research efforts establish the physiologic pathways through which stress may produce disease. Neurologic, immunologic, and endocrine mediators of the disease have been established. The hypothalamic-pituitary axis, the autonomic nervous system, and the catecholamine response are often cited as stress-sensitive systems. Frequent adverse health effects include psychological disorders,

cardiovascular disease, gastrointestinal disease, high levels of health service utilization, etc.<sup>27</sup>

Our study descriptively presented that the qualitative or quantitative workload stress revealed mean differences among academic conditions. The most significant mean comparison occurred between the exam and the holiday or lecture period. The previous RESIST cohort study in 2021 evaluated that the exam period caused a temporary enhancement in perceived stress and mental distress.<sup>28</sup> Both perceived stress and mental distress were lower before the exams (i.e., during the regular lecture period) than during the exam period, but higher before the exams than after the exams (enjoying the holiday). Higher mental distress during term time was, on average, associated with a greater arising in perceived stress from the term time to the exam period, when controlling for perceived stress levels during the term time. Hence, students who already had mental health problems before the exam period were most inducible to develop increased levels of stress during the exam.<sup>28</sup>

Education settings can improve student academic stress through the provision of programmes shown to decrease stress and stimulate stress management and coping. Education-based initiatives that focus on arising students' soft skills and ability to cope with stress have been previously promoted to directly and positively affect educational achievement and decrease health risks.<sup>26</sup> Understanding and addressing the barriers and enablers to the implementation of stress management programmes on campus would support the development of effective implementation projects, resulting in significant ergonomic health, economic and social benefits for consecutive numbers of students, and their circle. Therefore, the most appropriate stress-management education approaches may differ between the early batch and the last academic years.

## CONCLUSION

Academic stress is a chain of challenges that most students must receive consequently attending their academic study inside or outside the campus. Academic stress on junior students and the senior students' attention will influence their mental

health differently, even if they face exam periods or out-of-exam duties. The value of the student stress threshold is still quite understandable. They have to work on a project that is required for their graduation. It is useful for mature readiness for their future. However, the stakeholder must understand the quantitative and qualitative side of work stress that needs to be handled by the stakeholders to create a comfortable learning atmosphere and focus on outcomes.

#### Conflict of Interest

The author declares no conflicts of interest with regard to this study.

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