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Depression, Anxiety and Stress in Medical Students: An Early Observation Analysis

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Abstract

Studying a medical degree can create a stressful environment for students who are in the pre-clinical or clinical phase of their course. This study aims to determine both the effect of a medical programme on levels of depression, anxiety, and stress among Universiti Kebangsaan Malaysia (UKM) medical students before and during the course. A study was conducted with 133 first-year medical students enrolled in the 2018/2019 academic session in UKM. Levels of depression, anxiety and stress were measured using a validated questionnaire—the 21-item Depression Anxiety Stress Scale (DASS-21)—at two different time intervals: during orientation week (time 0) and early in the second semester (time 1). The collected data undergo statistical assessment with Wilcoxon Signed Ranks Test, Mann-Whitney U Test and Kruskal-Wallis H Test using SPSS v25.0. The medical students comprised 25.6% (n = 34) males and 74.4% (n = 99) females. More than half were Malay (60.9%, n = 81), followed by Indian (18%, n = 24), Chinese (12%, n = 16) and other races (9%, n = 12). There was a significant increase in depression ($Z = -4.263$, $p < 0.001$), anxiety ($Z = -2.235$, $p = 0.025$) and stress ($Z = -4.783$, $p < 0.001$) symptoms among UKM medical students after starting the medical programme. Unhealthy level of anxiety was found to be highly prevalent compared with depression and stress, at both time intervals. The association between anxiety and race during the medical programme appeared to be significant ($Z = 11.694$, $p = 0.009$). The medical students experienced higher depression, anxiety, and stress symptoms as early as 6 months during the medical programme. Preventive measures should be taken at an early stage to maintain medical students' good psychological health.

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1. Introduction

Medical study programmes in various public and private universities aim to train and produce competent and highly professional medical doctors to the benefit of the healthcare system. With such programmes requiring continuous focus and hard work for the whole five years, medical students tend to develop mental health problems during their studies (Dendle et al., 2018; Moutinho et al., 2017). These mental health problems include psychological stress, anxiety, depression, sleep pattern disorders, burnout, eating disorders and potentially hazardous alcohol use (Pacheco et al., 2017). When comparing to non-medical students, a study found that medical student had higher prevalence of depression while another studies reported lower prevalence of depression among medical students (Bacchi & Licinio, 2014). In addition, stress levels were found to be higher in medical students (Al-Dabal et al., 2010; Jafri et al., 2017; Seedhom et al., 2019). Medical students were at higher risk of physical and mental health problems than non-medical students due to the greater exposure to academic stress (Al-Dabal et al., 2010). Depression is a mood disorder characterised by loss of interest, feelings of sadness, hopelessness and worthlessness, changes in appetite and thoughts of suicide (NIMH, 2018). Anxiety is defined as a painful or apprehensive uneasiness of mind, usually concerning an impending or anticipated illness (Merriam-Webster, 2012); anxiety is a normal response to a challenge, but at a severe level it can be unhealthy. Stress is how a person mentally and physically reacts to circumstances that are considered difficult or challenging (Beckner, 2004). There are numerous studies identifying the prevalence of depression, anxiety and stress among university students, especially those undertaking a medical course. Depression, anxiety and stress have been found to be highly prevalent among medical students in various countries, including Nepal (Adhikari et al., 2017), Syria (Saadi et al., 2017) and Pakistan (Jafri et al., 2017). In Malaysia, extensive longitudinal and cross-sectional studies have been conducted across public and private universities to assess the prevalence of depression, anxiety, stress and associated factors among medical students (Fuad et al., 2015, 2016; Yusoff et al., 2010, 2013b). Recent publications have highlighted the relevance of psychological factors for the onset of medical conditions that worsened the quality of life (Martino et al., 2019; Merlo, 2019).

The mental health of medical students is influenced by sociodemographic variables including race, gender, marital status and family income. Some studies have reported an association between gender and depression (Fuad et al., 2015; Yusoff et al., 2013a), while others have found none (Fuad et al., 2016).

Students whose parents are highly educated and those whose families have higher incomes have been found to be less likely to suffer from psychological distress (Ibrahim et al., 2013; Islam et al., 2018; Yusoff et al., 2013a). According to another study, 75.6% of medical students perceived their stress to be due to their studies (Jafri et al., 2017). Academic-related stressors include exams, failure to achieve, poor time management, the large amount of content to be learnt, poor marks and the desire to do well (high self-expectations) (Khan et al., 2010; Kulsoom & Afsar, 2015; Yusoff et al., 2010). In addition, social issues, such as the death of loved one, relationship problem and home and family disharmony, can affect psychological health (Fuad et al., 2015; Khan et al., 2010; Robert, 1994).

Besides socio-economic status, psychological profiles appear to be the pushing factor for choosing medical profession, even though this career is well known to be difficult (Millan et al., 2005). The psychological profiles include a strong valuation of the humanistic aspects of medicine; openness to new experiences; a critical need for fulfilment in their careers; and conscious and unconscious desires to help people. Caring work like medical doctors is strongly characterized by the provision of reparative activities, involving internal goodness to repair damage in others. This challenges self-image and may trigger depressive and anxiety levels (Caputo et al., 2019, 2020; Millan et al., 2005).

Students suffering from poor mental health are likely to experience its negative consequences in personal, professional and academic matters (Abdullah et al., 2017; Jafri et al., 2017). Personal consequences can include having broken relationships, a decline in physical health, substance abuse and suicide (Dyrbye et al., 2005; Gan & Hue, 2019). One study found that the rate of suicidal ideation was higher in second-year students compared with first-year medical students (Fan et al., 2012; Sobowale et al., 2014); another, that students with depression were more likely to have thoughts of dropping out compared with students without depression (Adhikari et al., 2017). In terms of professional aspects, impaired academic performance, medical errors and impaired competency can occur (Dyrbye et al., 2005). The medical and healthcare professions are also exposed to death-related issues, that can contribute to increase their anxiety and sense of self-deficiency (Caputo, 2015).

The early identification of medical students who are at risk of depression, anxiety or stress is important in order to avoid the possible effects of mental health problems such as chronic disorders and suicide, and to help them in maintaining good psychological health during stressful periods of their medical programme. Yet, until now research comparing the mental health of UKM medical students before and during medical programmes has been limited.

Therefore, the objective of this study was to determine both the effect of a medical programme on levels of depression, anxiety and stress among UKM medical students, and associations between psychological health and demographic factors before and during the course.

2. Method

2.1 Study setting and participants

A cohort study was conducted with medical programme students in the Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM), during the 2018/2019 academic session. A total of 133 first-year medical students participated, the only additional inclusion criterion being that they had to be Malaysian citizens.

2.2 Data collection

The students were given clear information about the background of the study and gave their verbal consent to participate; their completion and submission of the questionnaire was considered to be a further declaration of their willingness to participate. After receiving brief instructions from the research assistant, they were given ten minutes to fill in the questionnaire.

Levels of depression, anxiety and stress among the medical students were measured using a validated questionnaire—the Depression Anxiety Stress Scale–21 Item (DASS-21). Data was collected at two different phases during the first-year of the programme: during orientation week (time 0, considered as the baseline measurement) and early in the second semester (time 1), 6 months after the students have started their classes. The data collection was carried out individually. The same student was evaluated twice using the same questionnaire, once upon enrolling in the course (the first day of their admission into the medical programme) and the second assessment was carried out 6 months after the first data collection. During the data entry, the students were matched across time points to determine the changes of their psychological health via statistical analysis. The study was conducted between September 2018 and February 2019.

2.3 Instrument

DASS-21 is a set of three self-report scales designed to measure levels of depression, anxiety and stress (Henry & Crawford, 2005; Lovibond & Lovibond, 1995; McDowell, 2006). Its validity and reliability among student subjects is well established (McDowell, 2006). The severity of depression, anxiety and stress symptoms was categorised as in Table 1.

The Malay DASS-21 version was used in this study. The translated Malay DASS-21 is reliable and well-adapted for the Malaysian general population (Ramli et al., 2009). It has a total of 21 questions, each of which is measured on a four-point Likert scale. There are three domains in DASS-21; depression, anxiety and stress, in which each domain is measured with seven items separately. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia (Lovibond & Lovibond, 1995). The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect (Lovibond & Lovibond, 1995). The Stress scale assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient (Lovibond & Lovibond, 1995). In completing DASS-21, the individual is required to indicate the presence of symptom over the previous week. Each item is scored from 0 (did not apply to me at all over the last week) to 3 (applied to me very much or most of the time over the last week).

Participants with scores in the normal and mild ranges were classified as 'psychologically unconcerned', while those with scores in the moderate to extremely severe range were classified as 'psychologically distressed' (Saadi et al., 2017).

Table 1. The categorisation of depression, anxiety and stress subscale scores

Domain	Severity				
	Normal	Mild	Moderate	Severe	Extremely severe
Depression	0-9	10-13	14-20	21- 27	28+
Anxiety	0-7	8-9	10-14	15-19	20+
Stress	0-14	15-18	19-25	26-33	34+

2.4 Statistical analysis

Data was analysed using the Statistical Package of Social Sciences (SPSS) version 25.0. The subscale scores from DASS-21 were not normally distributed based on the normality tests, namely, the Kolmogorov–Smirnov test and the Shapiro–Wilk test and therefore non-parametric statistics were used. Wilcoxon Signed Ranks Test was performed using paired samples, referring to the particular students that were matched across time points in order to compare their psychological health before and during medical programme. Mann-Whitney U test and Kruskal-Wallis H Test were performed on independent samples to determine the effects of age and race on the students' psychological health over time. The results of the tests were expressed in medians and interquartile ranges (IQR).

3. Results

Table 2 shows the demographic profiles of the participants (N = 133), with information about their gender, race and age. The mean age and standard deviation of the participants were 20.1 and 0.382, respectively. The sample was predominantly female (74.4%). More than half of all the respondents were Malay (60.9%), followed by Indian (18%), Chinese (12%) and Other races (9%). Most of the students were 20 years of age.

Table 2. Demographic characteristics of the sample of first-year medical students in Universiti Kebangsaan Malaysia (N = 133).

Characteristics	Frequency (n, %)
Sex	
Male	34 (25.6)
Female	99 (74.4)
Race	
Malay	81 (60.9)
Chinese	16 (12.0)
Indian	24 (18.0)
Others	12 (9.0)
Age (years)	
19	2 (1.5)
20	115 (86.5)
21	15 (11.3)
22	1 (0.8)

The depression, anxiety and stress scores at before and during the medical programmes were not normally distributed as the significant values of the Kolmogorov–Smirnov test and the Shapiro-Wilk Test were lower than 0.05. The prevalence of depression, anxiety and stress symptoms before and during the medical programme is summarised in Tables 3–5. The proportion of medical students experiencing unhealthy levels of depression, anxiety and stress (i.e. moderate to extremely severe levels) before starting the medical programme were 7.1%, 42.1% and 7.1%, respectively (Tables 3-5). During the medical programme, the proportion of students with significant depressive symptoms was 18.8% (Table 3). Just over half (50.4%) of the students had significant anxiety symptoms (Table 4), while the proportion reporting unhealthy level of stress was 18.1% (Table 5).

Table 3. The prevalence of depression among medical students before (time 0) and during (time 1) the medical programme, by level of severity (N = 133). Notes: *N* = total respondents, n_{rc} = total participants who responded in full. Time 0 = pre-start, Time 1 = 6 months after start of first year.

Levels of depression	Frequency (%)	
	Time 0 (n_{rc} = 126)	Time 1 (n_{rc} = 133)
Normal	96 (76.2)	82 (61.7)
Mild	21 (16.7)	26 (19.5)
Moderate	9 (7.1)	18 (13.5)
Severe	0 (0.0)	5 (3.8)
Extremely severe	0 (0.0)	2 (1.5)

Table 4. The prevalence of anxiety among medical students before (time 0) and during (time 1) the medical programme, by level of severity (N = 133). Notes: *N* = total respondents, n_{rc} = total participants who responded in full. Time 0 = pre-start, Time 1 = 6 months after start of first year.

Levels of anxiety	Frequency (%)	
	Time 0 (n_{rc} = 126)	Time 1 (n_{rc} = 133)
Normal	61 (48.4)	47 (35.3)
Mild	12 (9.5)	19 (14.3)
Moderate	38 (30.2)	42 (31.6)
Severe	9 (7.1)	9 (6.8)
Extremely severe	6 (4.8)	16 (12.0)

Table 5. The prevalence of stress among medical students before (time 0) and during (time 1) the medical programme, by level of severity (N = 133). Notes: *N* = total respondents, n_{rc} = total participants who responded in full. Time 0 = pre-start, Time 1 = 6 months after start of first year.

Levels of stress	Frequency (%)	
	Time 0 (n_{rc} = 126)	Time 1 (n_{rc} = 133)
Normal	106 (84.1)	88 (66.2)
Mild	11 (8.7)	21 (15.8)
Moderate	8 (6.3)	15 (11.3)
Severe	1 (0.8)	8 (6.0)
Extremely severe	0 (0.0)	1 (0.8)

The Wilcoxon Signed Ranks Test revealed that median depression scores during the medical programme were significantly higher ($p < 0.001$) than those observed before the start of the

medical programme (Table 6). There was also a significant increase in median anxiety scores between the two time points (p = 0.025). For the stress subscale, the students' scores during their first year of the medical programme were also significantly higher than they were at the beginning (p < 0.001).

According to the Mann-Whitney U test results, there was no statistically significant difference between males and females in relation to depression, anxiety or stress scores before or during their first year (Table 7). Nor did we find any effect of race on depression, anxiety or stress symptoms before the start of the medical programme (Table 8). However, early in semester 2 anxiety symptoms had increased (p = 0.009); those for depression and stress had not. Post-hoc analysis (Table 8) showed that anxiety scores were significantly lower among the Malay (p = 0.008) and Chinese (p = 0.006) students compared with 'Other race' students.

Table 6. Comparison of median scores for depression, anxiety and stress between two intervals (time 0, time 1). The data was measured using Wilcoxon Signed Ranks Test. * represents the significance level p < 0.05 (2-tailed). Notes: Time 0 = pre-start, Time 1 = 6 months after start of first year.

Variable	**Median (IQR)**		**Wilcoxon Signed Ranks Test**	
	Time 0	Time 1	Z statistics	*p* value
Depression	6.0 (2.0, 9.5)	8.0 (4.0, 12.0)	-4.263	< 0.001*
Anxiety	8.0 (4.0, 14.0)	8.0 (6.0, 14.0)	-2.235	0.025*
Stress	10.0 (6.0, 14.0)	12.0 (8.0, 16.0)	-4.783	< 0.001*

Table 7. Effect of gender on depression, anxiety and stress in medical students. The association between variables was measured using the Mann Whitney Test.

	Variable	**Median (IQR)**		**Mann Whitney Test**	
		Male	Female	Z statistics	*p* value
Before medical programme	Depression score	4 (7)	6 (8)	-1.292	0.196
	Anxiety score	7 (11)	8 (10)	-0.125	0.901
	Stress score	10 (10)	10 (8)	-0.268	0.788
During medical programme	Depression score	8 (7)	8 (6)	-1.331	0.183
	Anxiety score	11 (9)	8 (6)	-0.939	0.348
	Stress score	14 (9)	12 (8)	-1.446	0.148

Table 8. Effect of race on depression, anxiety and stress in medical students. The association between variables was measured using the Kruskal–Wallis test and post-hoc analysis, Mann Whitney Test. * represents the significance level $p < 0.05$ (2-tailed).

	Variable	Median (IQR)				Kruskal Wallis Test	
		Malay	Chinese	Indian	Other	Z statistics	*p* value
Before the medical programme	Depression score	6 (8)	4 (7)	5 (6)	2 (12)	0.928 (3)	0.819
	Anxiety score	7 (8)	6 (11)	7 (9)	12 (10)	2.029 (3)	0.566
	Stress score	10 (10)	8 (11)	12 (8)	12 (6)	1.826 (3)	0.609
During the medical programme	Depression score	8 (7)	4 (8)	8 (6)	8 (8)	3.285 (3)	0.350
	Anxiety score	8 (6)	6 (8)	13 (14)	14 (10)	11.694 (3)	0.009*
	Stress score	12 (6)	12 (9)	13 (12)	14 (8)	0.878 (3)	0.831

Variable	Race	Median (IQR)	Mann Whitney Test	
			Z statistics	*p* value
Anxiety score	Malay	8 (6)	-1.457	0.145
	Chinese	6 (8)		
	Malay	8 (6)	-1.647	0.099
	Indian	13 (14)		
	Chinese	6 (8)	-2.085	0.037
	Indian	13 (14)		
	Malay	8 (6)	-2.669	0.008*
	Other	14 (10)		
	Chinese	6 (8)	-2.764	0.006*
	Other	14 (10)		
	Indian	13 (14)	-0.731	0.465
	Other	14 (10)		

4. Discussion

The main findings of this study are the significant increases in depression, anxiety and stress symptoms among UKM medical students after starting their medical programme. Unhealthy level of anxiety was observed to be highly prevalent, compared with depression and stress, at both time intervals. Moreover, the association between anxiety and race appeared to be significant during the medical programme.

There have been a number of cohort studies investigating the prevalence of depression, anxiety and stress during medical study programmes (including the pre-clinical and clinical years). Depression, anxiety and stress have all been found to increase significantly among medical students across the years of their studies (Aktekin et al., 2001; Clark & Zeldow, 1988; Niemi & Vainioma, 2006). However, one study demonstrated that the psychological morbidity of medical students was not affected as the years of study increased (Guthrie et al., 1998). Another found that during the first year of a medical programme, depression, anxiety and stress symptoms were significantly increased at the midpoint of the first year compared with the beginning (Yusoff et al., 2013c). The present study shows a similar finding, suggesting that embarking on a medical programme marks a stressful transitional period that can cause a person to become more vulnerable to mental health problems. Medical students were reported to have greater risk of physical and mental health problems than non-medical students due to the academic stress (Al-Dabal et al., 2010). Academic aspects act as major stressors among medical students, for example examinations, poor time management, insufficient time for revision and the inability to cope with huge amounts of syllabus work (Yee & Yusoff, 2013; Yusoff et al., 2010). Living in a hostel with one's course mates may also create a competitive environment for certain students, causing them to push themselves to a greater extent to the detriment of their mental health. Health-promoting coping strategies, such as participating in social and sport activities in university, should be organised for medical students to prevent their psychological symptoms becoming worse as their years of study mount up.

This study found that among the psychological distress symptoms examined, anxiety was the most prevalent before and during the first year of a medical programme. The prevalence of unhealthy level of anxiety among UKM medical students appears to be lower than that reported among Universiti Sains Malaysia medical students prior to their medical programme (Yusoff et al., 2013b, 2013c). Between 41.1% to 56.7% of medical students in other institutions have been found to experience unhealthy anxiety level during their medical programmes (Fuad et al., 2015; Yusoff et al., 2013b); the prevalence of unhealthy anxiety level in the present study fell within that range. One possible reason for this high prevalence of anxiety is that the students were overly concerned about how well they would perform in the first year of their course and whether their academic performance would meet the high expectations of their families. Such worries about the future and fear of poor performance could have contributed to raising their anxiety. These two factors are related to the concept of reparation. Reparation refers to the capacity to effectively remedy to career challenges and failures by relying on one's own efforts and personal involvement and enrichment so in turn enhancing career adjustment (Caputo et al., 2019). The role of students' representations about their capacities to face future internship

and practical experiences should be expanded, so that they are well-prepared and able to maintain good psychological health during stressful period (Langher et al., 2014).

Our study showed no significant difference in levels of depression, anxiety or stress between male and female students at either of the two time points. This is in keeping with the majority of previous studies (Clark & Zeldow, 1988; Heinen et al., 2017; Smith et al., 2007; Yusoff et al., 2013b). However, a few studies have found female students to be significantly more anxious and distressed compared with male students (Abdallah & Gabr, 2014; Adhikari et al., 2017). Interestingly, another reported no gender differences in stress-coping strategies, for example seeking social and emotional support from loved ones, denial, self-criticism, and using behavioural and cognitive approaches to handle stressful situation (Monteiro et al., 2014). Thus, one possible explanation for our finding is that the male and female students were applying similar strategies for overcoming psychological distress.

Before starting the medical programme, race did not differentially influence our students' psychological health. This result contradicts that of a previous study which found the main factor associated with depression, anxiety and stress to be race (Yusoff et al., 2013b). A possible explanation for this could be that the different educational paths of students of different races, such as pre-university and A-levels educations, have differentially strengthened their maturity and ability to deal with psychological pressure. Interestingly, six months into the course race was found to be associated with anxiety but not significantly so with stress or depression; a finding that is in line with previous data (Yusoff et al., 2013a). In the present study, medical students of other races had higher anxiety symptoms than those of the Malay and the Chinese students. Medical students of other races could perceive a greater social pressure regarding their role based on expectations and demands from the general population (Caputo, 2013). In addition, a study in the USA found that African-American medical students were at greater risk for depressive symptoms and anxiety compared with white students at the start of their first-year medical programme (Hardeman et al., 2015). The present study may suggest that embarking on a medical study programme may cause cultural factors to exert significant impact on the psychological health of medical students. However, this is primarily hypothetical as the comparison between cultural background is not being studied in this study.

This study has several limitations. First, other factors associated with psychological health, such as parents' educational level, financial issues and the social relationships of medical students should be identified in order to try to explain why depression, anxiety and stress symptoms increase during the first year of medical programmes. Second, since DASS-21 is a self-report questionnaire, there may have been some degree of participant response bias (or social

desirability) in which the participants tend to respond positively towards questions instead of respond based on their true thought or feeling (Grimm, 2010). Self-report method relies on the honesty of the participants when answering the questionnaire. Besides that, there is possibility that the participants could misinterpret or misunderstand the particular questions (Hoskin, 2012). This study also does not have a comparison group according to a counterfactual perspective that does not consent to make causal inferences.

5. Conclusion

The medical students in this study experienced higher levels of depression, anxiety and stress symptoms during their medical programme compared with at the start of the programme. The prevalence of unhealthy anxiety level was higher than that of depression or stress at both phases of the medical programme examined. Race served as a significant factor affecting anxiety during the course. As a recommendation, the mental health of medical students should be monitored in every year of study to prevent the possible negative effects of mental illness. A series of wellness programmes should also be organised to improve levels of mental health literacy among the medical students of UKM. This study could also potentially highlights the relevance of considering psychological factors for promoting students' career adaptability and for potential career interventions in academic settings (Bocciardi et al., 2017; Langher et al., 2018).

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