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Prevalence and sources of stress among medical students in Universiti Sains Malaysia and Universiteit Maastricht.

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ABSTRACT

Introduction: Various studies had been done on medical students stress, but there is yet no comparative study done between universities in Asia and Europe. Universiti Sains Malaysia (USM) and Universiteit Maastricht (UM) share a lot in common in terms of medical education as both actively apply PBL-oriented education into their curriculum. It will be interesting to find out the effect of differing culture, one Eastern and another Western, on the prevalence of stress and stressors among medical students of both universities. **Method**: A comparative study was conducted on medical students from USM and UM. Psychological distress was measured by the 12 item General Health Questionnaire and stressors were measured by the 40 item Medical Student Stressor Questionnaire. The calculated sample size was 215 per university. The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 20. **Result**: Results showed that the overall prevalence of psychological distress among medical students of USM and UM was 25.9% and no significant difference was found between the two universities. Binary logistic regression test showed that medical students in pre-clinical phase were 1.84 times more likely to develop psychological distress than medical students in clinical phases (B = 0.612, odd ratio (CI95%) = 1.84 (1.16, 2.93), p = 0.010). The major stressors were related to academic requirements, UM medical students perceived the stressors as causing less stress than USM medical students (t-stat (df) = 5.33 (380), p-value < 0.001). **Conclusion**: Psychological health among medical students in the two universities was comparable. Academic requirements were the most stressful events as perceived by the students, but UM medical students had more positive perception toward the stressors than USM medical students. Pre-clinical students experienced higher psychological pressures than the clinical students. The medical schools should provide more attention to pre-clinical students because they might need psychological support from them.

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Introduction

The goal of medical education is to graduate knowledgeable, skillful, and professional physicians that will play an essential role in the society. Medical education have came a long way since Hippocrates and have evolved into a more organized and effective mechanism. However, some aspect of training may have produced some unintended negative stress on medical students' mental and emotional health. A recent multicenter study among first-year undergraduate medical students in four Malaysian universities reported an overall prevalence of stress is 50% at the end of year (1). While a study reported a prevalence of 21.9% to 36.5% across years of study at the beginning of year in a Malaysian medical school (2). Internationally the prevalence of psychological distress ranges from 21% to 62.7% across different phases of medical training (1-17).

Various stressors have been implicated as the possible cause of such distress. One of the major factors is academic and adjustment to medical school environment as a whole (2). Increased scholastic workload and concern for academic performance are among the recognized causes (2, 18). Besides that, interpersonal interactions between students and teachers can subtly but profoundly influence students (19). Medical students in the clinical years are confronted frequently with issues related to death and dying for the first time and they are reported to be often fearful, anxious, and hesitant to interact with dying patients (20). These stressors are unique to those in the health care field and medical student are often the ones who bore the brunt of the damage due to lack of preparedness.

On personal level, this stress may lead to substance abuse (21) or even suicide (22). On professional level, this stress may contribute to impaired academic performance (23, 24)[10] and also to cynicism (18, 25) with decline in empathy and humanitarianism. Overall this may affect students' care of patients, relationship with faculty, and ultimately the culture of the medical profession.

Early detection of psychological condition is important to prevent psychological morbidity and its unwanted effects on medical students (18, 26, 27) and early detection is possible by determining the prevalence of stress among medical students. The next step of identifying of stressors of students can further pinpoint the source of the problem and assists in finding solutions.

Various studies regarding medical students stress had been done, but there is yet to be a comparative study done between universities in Asia and Europe. Universiti Sains Malaysia (USM) and Universiteit Maastricht (UM) share a lot in common in terms of medical education as both actively apply PBL-oriented education into their curriculum. It will be interesting to find out the effect of differing culture, one Eastern and another Western, on the stress prevalence and stressors among the medical students of both universities. The result of this study may prove invaluable to both universities for the mutual improvement in the name of medical education.
This study aimed to answer five questions that include; 1) what are the prevalence of psychological distress among medical students of both universities? 2) What are the common stressors among medical students of both universities? 3) Is there any significant different of prevalence of psychological distress between the two universities? 4) Is there any significant different of perceived stressor by medical students between the two universities? 5) Is there any significant association between phases of medical training and psychological distress of both universities?

Methodology

Study Design

A comparative study was conducted in 2010 on medical students from medical faculties of two universities, USM and UM.

Study Participants

For the inclusion criteria, all pre-clinical and clinical year students (Year 1 to 5 in USM and Year 1 to 6 in UM) from medical faculties of the two universities were eligible to participate in

this study. For the exclusion criteria, medical students who refused to participate and who were not reachable during the study.

Sample Size Calculation

The sample size was calculated by the sample size and power calculator (SPPC) using two proportions formula (28). The prevalence of psychological distress among medical students was approximately 30% (2) and the general population was approximately 18% (29). Calculated sample size based on significant level of 0.05 and power of study of 0.80 was 195 per university. The adjusted sample size after 10% dropout rate was 215 per university.

Sampling Method

Due to the time constraint and availability of medical students at both universities during study period (i.e., about 6 weeks), purposive sampling method was applied. A total of 215 medical students across years of study at both universities were invited to participate in this study.

Measurement tools

Questionnaire, which consists of validated GHQ-12 (30-33) and 40 item Medical Student Stressor Questionnaire (MSSQ-40) (34-37), were administered to the selected medical students. Both questionnaires were well validated among medical students. Relevant demographic profiles such as sex, years of study and university were collected by a structured demographic form. In USM, year 1 to 3 is pre-clinical year and year 4 to 5 is clinical year. In UM, year 1 to 3 is pre-clinical and year 4 to 6 is clinical year. GHQ scores more than 3 was considered as psychological distress (30-33). Mean scores for MSSQ domains and items were categorized into causing none to mild stress (0 to 1), causing mild to moderate stress (1.01 to 2), causing moderate to high (2.01 to 3) and causing high to severe stress (3.01 to 4) (34-37).

Data Collection

Ethical clearance was obtained from the Human Ethical Committee USM and permission was sought from UM prior to study begin. All participants were given information about the study, verbal and signed consents were taken from them. The guided self-administered questionnaire was done to collect the data. Data was collected within 6 weeks.

Statistical Analysis

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive analysis was performed to report demographic profile. Chi-square test was performed to test different between factors and categorical outcomes. Independent-t test was performance to test different between factors and continuous outcomes. Binary logistic regression was performed to estimate odd ratio. Assumptions of each statistical was checked prior to analysis.

Result

Table 1: Demographic profiles of medical students by university

Variable	USM	UM
Sex, n (%)		
Male	071 (34.6)	084 (47.5)
Female	134 (65.4)	093 (52.5)
Total	205 (100)	177 (100)
Phase of training, n (%)		
Pre-clinical	095 (46.3)	082 (46.3)
Clinical	110 (53.7)	095 (53.7)
Total	205 (100)	177 (100)
Psychological health status, n (%)[a]		
Non-distress	145 (70.7)	138 (78.0)
Distress	060 (29.3)	039 (22.0)
Total	205 (100)	177 (100)
Stressor, mean (SD)[b]		
Academic**	1.99 (0.82)	1.57 (0.71)
Inter- & intrapersonal	0.97 (0.92)	1.08 (0.89)
Teaching & Learning	1.19 (0.90)	1.07 (0.76)
Social*	0.87 (0.68)	1.06 (0.61)
Drive & Desire	0.66 (0.82)	0.66 (0.68)
Group activities**	1.49 (0.95)	1.07 (0.78)

[a] Chi-square test was performance, p-value less than 0.05 was considered as significant difference. [b] Independent-t test was performance, p-value less than 0.05 was considered as significant difference; SD = standard deviation; **p-value < 0.001, *p-value < 0.01

A total of 382 medical students participated in this study; 205 USM and 177 UM medical students (Table 1).

The overall prevalence of psychological distress among the medical students was 25.9% (i.e. 99 out of 382 medical students). Specifically, the prevalence among USM medical students (29.3%) was higher than UM medical students (22%) (Table 1), however no significant difference was found (X^2 (df) = 2.59 (1), p = 0.108).

Three stressors were significantly difference between the two universities; academic (t-stat (df) = 5.33 (380), p-value < 0.001), social (t-stat (df) = -2.87 (380), p-value = 0.004), and group activities (t-stat (df) = 4.71 (380), p-value < 0.001) as shown in table 1. In other hand three stress were not significantly difference between the two universities; inter- & intrapersonal (t-stat (df) = -1.18 (380), p-value = 0.234), teaching & learning (t-stat (df) = 1.34 (380), p-value = 0.182), and drive & desire (t-stat (df) = --0.02 (380), p-value = 0.986) as shown in table 1.

Table 2: Association of psychological distress with phase of medical training

Variable	Psychological distress, n (%)		X^2-statistics (df)	p-value
	Yes	No		
Phase of training				
Pre-clinical	57 (32.2)	120 (67.8)	6.79 (1)	0.009
Clinical	42 (20.5)	163 (79.5)		
Pre-clinical phase				
USM	35 (36.8)	60 (63.2)	2.02 (1)	0.155
UM	22 (26.8)	60 (73.2)		
Clinical phase				
USM	25 (22.7)	85 (77.3)	0.73 (1)	0.393
UM	17 (17.9)	78 (82.1)		

Chi-square test was performed to test association between phase of medical training and psychological distress status. Results showed that the phase of medical training was significantly associated with psychological distress (Table 2). The percentage of psychological distress was significantly higher in the pre-clinical phase (32.2%) than the clinical phase (20.5%). Subgroup analysis within each phase of medical training, it appeared that psychological distress was more prevalent among USM medical students than UM medical students, however no significant different was found (Table 2)

Binary logistic regression test showed that medical students in pre-clinical phase were 1.84 times more likely to develop psychological distress than medical students in clinical phases (B = 0.612, odd ratio (CI95%) = 1.84 (1.16, 2.93), p = 0.010; model summary, X^2 = 6.79, -2 Log likelihood 430.4, p = 0.009; university and sex were included in the analysis and showed no significant results).

Subgroup analysis of stressor between the two universities was performed and summarised in table 3. The analysis showed that only one stressor was perceived as causing moderate to high stress by UM medical students (i.e., examinations), however it is significantly lower than USM medical students. Five stressors (i.e., examinations, large amount of contents to be studied, lack of time to review what have learnt, not enough medical skills, and need to well due to self-expectation) were perceived as causing moderate to high stress by USM medical students. Overall, UM medical students had more positive perception towards stressors compared to the USM medical students except for social related stressors.

In summary, the results showed that the overall prevalence of psychological distress among medical students of USM and UM was 25.9% and no significant difference was found between the two universities. Interestingly, medical students in clinical phase had better psychological health than those in pre-clinical phase. As expected, the major stressors were related to academic requirements. It appeared that UM medical student had more positive perception towards most of the stressors compared to USM medical students.

Table 3: Stressors that were perceived significantly different by USM and UM medical students

Stressor	Perceived stress, mean (SD)		t- statistics (df)	p-value
	USM	UM		
Academic				
Examinations	2.77 (0.99)	2.06 (1.00)	6.93 (380)	< 0.001
Large amount of contents to be learnt	2.42 (1.09)	1.80 (1.06)	5.64 (380)	< 0.001
Lack of time to review what have learnt	2.34 (1.12)	1.63 (1.04)	6.43 (380)	< 0.001
Not enough medical skill practice	2.16 (1.10)	1.59 (1.11)	5.02 (380)	< 0.001
Need to do well (self-expectation)	2.04 (1.16)	1.79 (1.21)	2.08 (380)	0.038
Heavy workload	1.99 (1.10)	1.64 (0.97)	3.19 (380)	0.002
Unable to answer the questions from teachers	1.99 (1.19)	1.44 (1.12)	4.59 (380)	< 0.001
Falling behind in reading schedule	1.94 (1.16)	1.36 (0.94)	5.33 (380)	< 0.001
Having difficulty in understanding the content	1.90 (1.12)	1.42 (1.05)	4.29 (380)	< 0.001
Quota system in examinations	1.56 (1.27)	0.95 (1.04)	5.05 (380)	< 0.001
Learning context full of competition	1.56 (1.15)	1.25 (1.03)	2.72 (380)	0.007
Inter- & intrapersonal				
Poor motivation to learn	1.43 (1.31)	1.14 (1.07)	2.37 (380)	0.018
Verbal or physical abuse by teachers	0.98 (1.28)	1.08 (1.21)	-2.34 (380)	0.020
Conflicts with teachers	0.82 (1.20)	1.24 (1.13)	-3.43 (380)	0.001
Conflicts with personnel	0.75 (1.15)	1.02 (1.16)	-1.99 (380)	0.047
Teaching & Learning				
Lack of guidance from teachers	1.29 (1.23)	0.89 (0.99)	3.42 (380)	0.001
Teachers lack of teaching skills	1.23 (1.23)	0.97 (0.92)	2.29 (380)	0.023
Not enough study material	1.19 (1.14)	0.95 (1.03)	2.06 (380)	0.040
Social				
Lack of time for family and friends	1.20 (1.21)	1.50 (1.02)	-2.62 (380)	0.009
Unable to answer questions from patients	1.09 (1.12)	1.42 (1.06)	-3.00 (380)	0.003
Facing illness or death of the patients	0.94 (1.04)	1.40 (1.11)	-4.15 (380)	< 0.001
Talking to patients about personal problems	0.45 (0.85)	0.76 (0.86)	-3.53 (380)	< 0.001
Drive & Desire				
Parental wish for you to study medicine	0.58 (0.98)	0.39 (0.83)	2.03 (380)	0.043
Group activities				
Need to do well (imposed by others)	1.58 (1.18)	1.25 (1.09)	2.85 (380)	0.005
Participation in class presentation	1.54 (1.14)	1.07 (1.04)	4.12 (380)	< 0.001
Feeling of incompetence	1.48 (1.19)	1.21 (1.16)	2.18 (380)	0.030
Participation in class discussion	1.37 (1.20)	0.74 (0.92)	5.67 (380)	< 0.001

Discussion

Our study found that the prevalence of psychological distress among medical students of both USM and UM was 25.9%. This finding is in line with literature reported that the overall prevalence ranges from 21% to 62.7% across different phases of medical training (1-17); in fact it is at the low side. We found that the prevalence of psychological distress among UM medical students was 22% and among USM medical students was 29.3%; it seems that UM medical students had less prevalence compared to USM medical students, however no significant difference was found. This finding suggested that psychological health among medical students in UM and USM was comparable as well as with findings reported in the literature (1-17). Conversely, the prevalence is still higher than the prevalence of general population, less than 18% (29), as well as prevalence of prospective medical students, less than 3% (4, 38). Despite

considerably low prevalence found in this study, yet active and preventive measures should be brought in by medical schools at earliest possible because early intervention could buffer the unwanted consequences of psychological distress on medical students' personal and professional development (18, 26, 27).

Interestingly, we found that medical students in the clinical years experienced less psychological distress compared to medical students in the pre-clinical years. In facts, analysis showed that those in pre-clinical were 1.8 times more likely to develop psychological distress than those in clinical years. At the beginning, we anticipated that those in clinical years would experience more psychological pressures than those in pre-clinical years because logically the commitment and workload would be heavier in the clinical years compared to the pre-clinical years. However, this finding is consistent with a previous study reported that medical students in clinical years demonstrated less psychological pressure than the pre-clinical years (2). One possible reason for the low psychological distress in clinical year students is that they have developed skills to manage their studies and therefore are better able to cope with stress, in comparison to students in pre-clinical years (2). One important lesson learnt is that more attention should be given to the pre-clinical medical students due to they are at a transitional period for adjustment with the demanding medical training environment thus they might need psychological support from medical schools. Medical schools could introduce a stress reduction intervention to help them to deal with the demanding environment (18, 26, 27). This study found no significant relationship between sex and psychological distress; therefore signify male and female students were equally vulnerable to develop psychological distress.

As we anticipated, the major stressors for both universities were related to academic requirements (table 1 and table 3) and this is consistent with previous findings (1, 2, 18, 39, 40). Likewise, our findings support findings from previous studies reported that regardless of medical education setups, the main stressors would be similar but the frequency might be different (39, 40). Results demonstrated USM medical students perceived academic requirements as causing significantly more stress than the UM medical students. In other word, the UM medical students had healthier perception or mindset about the academic requirements than the USM medical students. It is worthy to highlight, medical students who perceived academic requirement as causing unfavourable stress are 16 times more risk to develop psychological distress compared to those who perceived it as causing favourable stress (1). One important lesson learnt is that a curriculum should be designed in a way that could optimize the balance between the 'push' factors (bringing out the best in students and maintaining standards) and induction of unnecessary psychological pressure (1). Perhaps, a challenging task for medical educators is to come out with a psychological-friendly medical curriculum to remedy this chronic situation. Training medical students to have healthy mindset towards academic requirements as well as other stressors might help them to deal with the demanding medical training environment (26, 27).

This study has several limitations which need to be considered in the future. The first limitation was related to the sample size due to inadequate samples of UM medical students therefore the comparison might not reflect the true different between the two universities. The second was related to non-probability sampling method employed in this study that may lead to bias in selection of study subjects therefore may result in inaccurate results. The third was related to the study design which may not reflect the real pattern of psychological distress in the study population due to cross-sectional in nature, thus limiting its generalisability to different time intervals. The last limitation was the study population involved only from two educational settings, which the results may not be generalized to other educational settings. Considering all these limitations the results of this study should be interpreted cautiously.

Conclusion

Psychological health among medical students in the two universities was comparable. Academic requirements were the most stressful events as perceived by the students, but UM medical students had more positive perception toward the stressors than USM medical students. Pre-clinical students experienced higher psychological pressures than the clinical students. The medical schools should provide more attention to pre-clinical students because they might need psychological support from them.

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