Original Article

# Prevalence and Sources of Stress among Universiti Sains Malaysia Medical Students

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## Abstract

***Background:*** **Being in medical school has always been regarded as highly stressful. Excessive stress causes physical and mental health problems. Persistent stress can impair students' academic achievement and personal or professional development. The aim of this study is to explore the nature of stress among medical students by determining the prevalence, sources and pattern of stress and the factors affecting it.**

***Methods:*** **We chose a cross-sectional study design utilizing validated questionnaires, the 12 items General Health Questionnaire (GHQ-12) and Medical Student Stressor Questionnaire (MSSQ), to evaluate stress levels and stressors. School and ethical committee clearance were obtained prior to the study. Data were analysed using SPSS version 12.**

***Results:*** **Of the medical students who were administered the questionnaire, 761 (72%) respondents participated in this study. The prevalence of stress among the medical students was 29.6%. The top 10 stressors were academic-related. Prevalence of stress for the first, second, third, fourth and fifth year students was 26.3%, 36.5 %, 31.4%, 35.3% and 21.9%, respectively. Year of study was the only significant factor affecting stress among medical students (*P*-value < 0.05).**

***Conclusions:*** **The prevalence of stress among medical students in USM is high. Academic-related problems were the major stressor among medical students. Year of study was the factor most significantly associated with medical students' stress. There was a bimodal pattern of the stress level throughout the year of study.**

***Keywords:*** *medical students, mental health, stress, medical sciences*

## Introduction

Tertiary medical training has always been regarded as being highly stressful. Many studies have described the stressors of medical training and the associated negative consequences on the mental and physical health of medical students (1–10).

Stress is defined as the body's non-specific response to demands made upon it, or to disturbing events in the environment (11–12). It is not just a stimulus or a response but rather, it is a process by which we perceive and cope with environmental threats and challenges (13). Personal and environmental events that cause stress are referred to as stressors (14). In short, stress includes the emotional disturbances or changes caused by stressors. Linn & Zeppa (15) have suggested that some stress in medical school training is needed for learning. Stress that facilitates learning is called 'favourable stress' and stress that suppresses learning is called 'unfavourable stress'. Depending upon their cultural backgrounds, personal traits, experience and coping skills, medical students may perceive the same stressors differently.

An optimal level of stress, referred to earlier as 'favourable stress', can enhance learning (16). However, excessive stress can lead to physical and mental health problems (17). It can reduce students' self-esteem (16,18) and may affect academic achievement and personal or professional development. Studies in the United States have suggested that the practice of medicine entails certain risks to the mental health of qualified medical students (19), and numerous studies have revealed high rates of psychological

morbidity in medical students at various stages of their training (1,3–5,20). Other studies among medical students have found that stress is associated with anxiety and depression (21–22), interpersonal conflict (23), sleep disturbances (24), and poor academic or clinical performance (15). Stress was also found to decrease attention, reduce concentration, impinge on decision-making, and reduce students' abilities to establish good relationships with patients (21). As a consequence, students have reported feelings of inadequacy and dissatisfaction with clinical practice in the future. This may affect the lives of patients and the health of a community. Moreover, stress has also been linked to medical student suicide (25), drug abuse (26–27), and alcohol use (28). A study conducted in the United Kingdom reported that over one-third of medical students suffered from emotional disturbances as measured by the General Health Questionnaire (GHQ) (3–5). A study conducted in a Malaysian university reported that 41.9% of medical students had emotional disorders based on the GHQ (9).

The objective of this study was to determine the prevalence, sources and predictors of stress among USM medical students. We reasoned that this information would be useful to establish a database on the extent of the problem. Notably, an understanding of these factors could help in the planning of measures to reduce stress.

## Materials and Methods

We carried out a cross-sectional study of 1058 medical students enrolled in the School of Medical Sciences (SMS), Universiti Sains Malaysia (USM), during the 2008/2009 academic session. Data were collected using a questionnaire comprised of two parts: (i) sociodemographic questions and (ii) questions designed to elicit information about the sources and levels of stress. We collected sociodemographic information including: gender, year of study, race, grades in subjects such as English, Malaysian language, Physics, Additional Mathematics, and Biology, entry qualifications, religion and involvement with co-curriculum activities. Some details were required in the co-curriculum section to enable scoring and categorizing into active and inactive groups. We chose these variables based upon prior studies illustrating their association with stress.

One of the most widely used tools to measure stress levels is the 12-item General Health Questionnaire (GHQ-12). Various studies have demonstrated reliability GHQ-12 coefficients ranging from 0.78 to 0.95. The items on the GHQ-12 represent 12 manifestations of stress, and respondents were asked to rate the presence of each of these manifestations in themselves during the recent week preceding the study period. Subjects respond to each question by choosing from four typical responses: 'not at all', 'no more than usual', 'rather more than usual' and 'much more than usual'. A binary scoring method is used to evaluate responses. This method assigns a score of zero to the two least symptomatic answers and a score of one to the two most symptomatic answers; thus, responses can only be scored as zero or one. 'Caseness' was defined as a total questionnaire score of 4 or more (29-30).

In this study, a similar questionnaire was used to measure stress levels and a newly developed instrument, the Medical Students Stressor Questionnaire (MSSQ), was used to identify sources of stress. The items on MSSQ represent 40 events that have been reported to be possible sources of stress in medical students. Respondents were asked to rate each event in themselves during the recent weeks by choosing from five responses: 'causing no stress at all', 'causing mild stress', 'causing moderate stress', 'causing high stress' and 'causing severe stress'. The MSSQ is scored by assigning a value of zero to four for each of the respective responses. For example, a response of 'causing no stress at all' would be scored as zero and a response of 'causing severe stress' scored as four. In order to test the validity and reliability of both instruments in a medical student population and to determine the appropriate GHQ-12 score for 'caseness', both questionnaires were piloted to 141 newly graduated medical students of the 2007/2008 academic session. From the pilot data, we calculated Cronbach's alpha values for the GHQ-12 and MSSQ of 0.85 and 0.95, respectively. The sensitivity and specificity of the GHQ-12 at the cut-off point of 4 were 81.3% and 75.3%, respectively. The positive predictive value was 62.9%, comparable to the Goldberg findings (29-30). The pilot study showed that both questionnaires were valid and could reliably measure stress levels and identify stressors among medical students. Respondents with a score of 4 or greater on the GHQ-12 were considered to be under significant unfavourable stress, defined as 'caseness' in this study.

Data collection was performed two months after the start of the 2008/2009 academic session. We chose this period to avoid the stressful examination period, which could potentially introduce measurement bias. Thus, we reasoned that the level measured was representative of the natural level of stress in medical students. The questionnaires were semi-structured, self-administered questionnaires which were

distributed to the medical students during face-to-face sessions in a lecture hall separately according to the year of study. The students were told to follow the instructions. The process of filling in the questionnaire took about 15 minutes to complete and they were to be returned on the same day. Verbal consent was obtained from all participants. Completion of the questionnaires was voluntary and would not affect their progression on the medical course. Clearance was obtained from the school and ethical committee prior to the start of the study.

Data were analysed using Statistical Package for Social Sciences (SPSS) version 12. All data collection forms were given serial numbers. Data were entered, checked for data entry errors, explored and cleaned. Data were interpreted using an alpha (α) set at 0.05 and confidence interval of 95%. Descriptive statistics were used for the analysis of the demographic data, the students' stress prevalence based on the GHQ-12 score and the stressor items. Assumptions were made before running statistical tests. Binary Logistic Regression was applied to determine the predictors of stress.

## Results

A total of 761 (72%) out of 1058 medical students responded, 474 (62.3%) of which were female students. All years of study were approximately equally represented: 213 students (28%) from year one, 104 students (13.7%) from year two, 159 students (20.9%) from year three, 139 (18.3%) from year four and 146 (19.2%) from year five. With regards to ethnicity, 459 (60.4%) were Malay, 266 (35%) were Chinese, 33 (4.3%) were Indian and 3 (0.3%) were self-reported as other. Several religions were represented in the sample: 462 (60.7%) were Muslim, 206 (27.1%) were Buddhist, 53 (7%) were Christian, 29 (3.8%) were Hindu and 11 (1.4%) were reported as other. Most students (79.1%) were from the matriculation programme. The majority of them (73.2%) have excellent academic results (their qualification far exceeds the stipulated entry qualification which is at least B in all subjects) and co-curriculum backgrounds prior to their entry into medical school.

Figure 1 shows that the overall prevalence of stress (GHQ score of 4 as the cut-off point) among the students was 29.6%. The prevalence

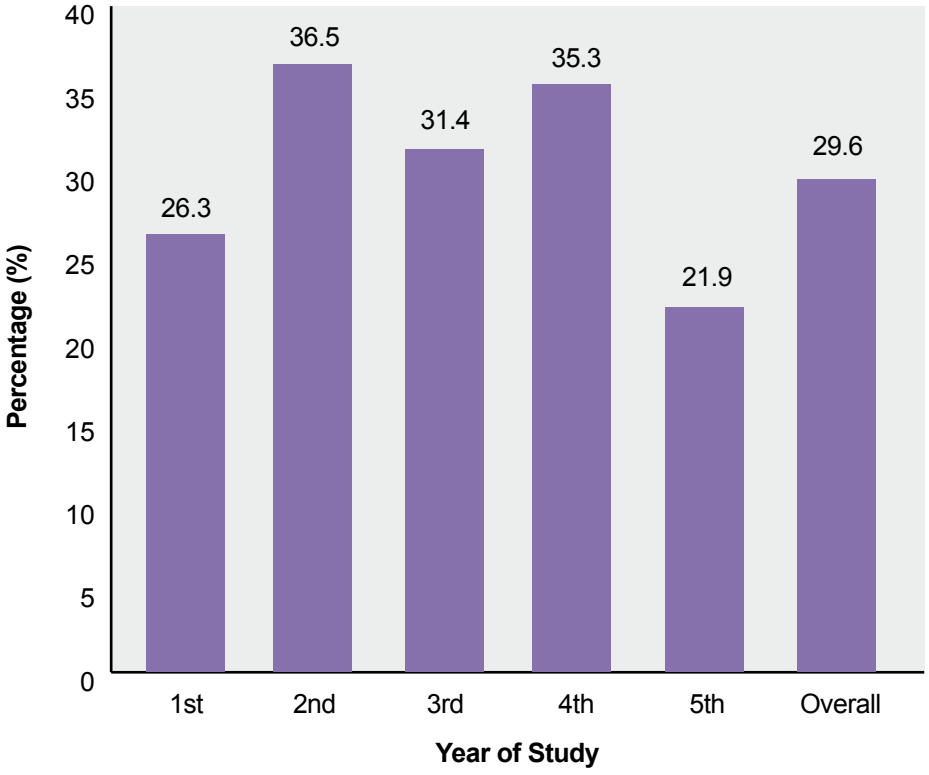


**Figure 1:** Prevalence of stress among medical students in School of Medical Sciences, Universiti Sains Malaysia according to year of study.

of stress for first, second, third, fourth and fifth year students were 26.3%, 36.5 %, 31.4%, 35.3% and 21.9%, respectively. We observed the highest prevalence of stress among second and fourth year students. The lowest prevalence of stress was observed among the first and fifth year students. The stress prevalence among third year students was at an intermediate level between the highest and the lowest levels. Table 1 shows the rank of each stressor based on the degree of stress perceived by the students. All of the top 10 stressors were basically academic-related stressors.

Binary Logistic regression (Forward Stepwise Method) was applied to determine the predictors of stress among medical students. The only significant predictor of stress was year of study ($X2 = 10.16$, $P = 0.038$). Indeed, 19 percent of the stress level among medical students was influenced by year of study (Nagelkerke $R2 = 0.19$). This study indicates that the main predictor influencing the stress level of medical students was year of study. Gender, race, religion, academic achievement, extracurricular achievement and qualification entry were not predictors of stress among medical students.

## Discussion

The relatively high response rate in this study (approximately 72%) is similar to the 70%-80% response rate obtained by other studies (3,31). This is perhaps an indication of the strength of students' feelings and their perceived need for a medical education curriculum that minimizes their stress during the course of medical studies. Medical programmes have always been regarded as a popular choice for tertiary education (9). Only those who have excellent academic achievement can be successful in the course. Therefore, the medical programme may be even more competitive and stressful for students who are accepted (6).

Based on previous studies, stress prevalence among medical students ranges from 30% to 50% (1–6,9–10,20). This level of stress is high in comparison to that of the general population (3) and that of students in other courses of study (1,6). It is noteworthy that excessive exposure to stress causes physical and mental problems (17), and therefore it is important to detect stressed students earlier in order to prevent deleterious

**Table 1:** Stressors (identified by the Medical Student Stressor Questionnaire) ranked by mean degree of stress perceived by medical students

| Rank | Items | *Degree of stress Mean (SD) |
|---|---|---|
| **Causing moderate to high stress** | | |
| 1 | Tests/examinations | 2.63 (1.00) |
| 2 | Large amount of contents to be learnt | 2.39 (1.04) |
| 3 | Lack of time to review what have been learnt | 2.27 (1.08) |
| 4 | Getting poor marks | 2.09 (1.22) |
| 5 | Need to do well (self-expectation) | 2.06 (1.19) |
| 6 | Not enough medical skill practice | 2.03 (1.16) |
| 7 | Falling behind in reading schedule | 2.02 (1.13) |
| **Causing mild to moderate stress** | | |
| 8 | Heavy workload | 1.91 (1.11) |
| 9 | Having difficulty understanding the content | 1.89 (1.11) |
| 10 | Unable to answer the teachers' questions | 1.87 (1.13) |
| 11 | Learning context – full of competition | 1.64 (1.15) |
| 12 | Need to do well (imposed by others) | 1.53 (1.18) |
| 13 | Quota system in examinations | 1.50 (1.25) |
| 14 | Feeling of incompetence | 1.43 (1.18) |
| 15 | Poor motivation to learn | 1.43 (1.29) |
| 16 | Participation in class presentation | 1.41 (1.13) |

| | | |
|---|---|---|
| 17 | Inappropriate assignments | 1.33 (1.25) |
| 18 | Uncertainty of what is expected of me | 1.26 (1.22) |
| 19 | Lack of time for family and friends | 1.24 (1.22) |
| 20 | Teacher – lack of teaching skills | 1.23 (1.18) |
| 21 | Unjustified grading process | 1.21 (1.15) |
| 22 | Participation in class discussion | 1.21 (1.10) |
| 23 | Lack of guidance from teacher(s) | 1.15 (1.15) |
| 24 | Frequent interruption of work by others | 1.12 (1.17) |
| 25 | Not enough study material | 1.12 (1.12) |
| 26 | Unable to answer questions from patients | 1.10 (1.12) |
| 27 | Conflicts with other students | 1.07 (1.14) |
| 28 | Lack of recognition for work done | 1.06 (1.13) |
| 29 | Facing illness or death of the patients | 1.05 (1.16) |
| **Causing nil to mild stress** | | |
| 30 | Not enough feedback from teacher(s) | 0.92 (1.08) |
| 31 | Family responsibilities | 0.92 (1.16) |
| 32 | Verbal or physical abuse by teacher(s) | 0.87 (1.18) |
| 33 | Conflict with personnel(s) | 0.86 (1.11) |
| 34 | Verbal or physical abuse by other student(s) | 0.76 (1.10) |
| 35 | Verbal or physical abuse by personnel(s) | 0.75 (1.11) |
| 36 | Conflict with teacher(s) | 0.75 (1.10) |
| 37 | Parental wish for you to study medicine | 0.57 (0.98) |
| 38 | Unwillingness to study medicine | 0.56 (1.05) |
| 39 | Working with computers | 0.54 (0.93) |
| 40 | Talking to patients about personal problems | 0.50 (0.90) |

* Degree of stress classification: 0 - 1.00 is 'causing nil to mild stress', 1.01 – 2.00 is 'causing mild to moderate stress', 2.01 – 3.00 is 'causing moderate to high stress' and 3.01 – 4.00 is 'causing high to severe stress'

long-term effects of stress on the students (1,3–4,9).

The prevalence of stress among medical students in the SMS, USM (29.6%), as measured by the GHQ-12, was lower in comparison to that reported in other studies among medical or non-medical students using the same questionnaire (1,3,5–6,20). For example, the prevalence of stress in Singapore law students and medical students was 47.2% and 57%, respectively (6). One possible reason for the lower prevalence of stress is that, since it's inception, the school has incorporated personal and professional development elements into it's curriculum where relevant inputs such as ethics, communication skills, professionalism and leadership could be imparted to students at various places in the time table (32). This observation is in keeping with the General Professional Education of Physician (GPEP) Report of the Association of American Medical Colleges (AAMC), which recommends enhancing the personal development of students to help them cope with the stress of tertiary education. However, even though the prevalence is lower in comparison to other studies, it remains high compared to the general population in the UK (less than 10% as reported by Firth in 1986). A comparison of the prevalence to the Malaysian population could not be made since data reflecting the stress prevalence in the Malaysian population were not available. We recommend that a study be undertaken to examine the prevalence of stress among the general population of Malaysia in order to obtain the baseline data.

It should be noted that a stress prevalence of 29.6%, as recorded by SMS, USM, is much lower in comparison to the results of other studies. For example, prevalences of 41.9% and 46.2% were measured in a Malaysian government medical school and in a Malaysian private medical school,

respectively (9,10), both determined by the GHQ. We recommend that a multi-centre study be carried out to establish the baseline prevalence of stress among Malaysian medical students as well as to investigate this matter further.

In this study, we found a lower stress prevalence in both first and final year students (26.3% and 21.9%, respectively) in comparison to students in other years of study (prevalences of 36.5%, 31.4%, and 35.3 for second, third, and fourth year students, respectively). One possible reason for the low stress prevalence in final 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 other years of study. Moreover, the first year students had just entered the course 2 months prior and may have still been experiencing the stages of novelty and euphoria. In addition, during this time period, they had yet to face difficult subjects because most of the subjects studied during the first 3 months are subjects that the students have learned during their matriculation and STPM.

This present study also showed that the highest prevalence of stress among USM medical students was among second and fourth year students. This was an interesting finding because both of these groups were in the early stage of phase two and phase three, respectively. Since each phase requires a different learning approaches, a possible reason for the high stress prevalence could be the impact of the transitional and adaptation periods due to the new phases of study (6). That is, the students in their second and fourth year may experience more stress compared to other years of study because they are struggling to adjust their learning approaches according to the new phase requirements. Nevertheless, because this is a cross-sectional study that provides only a snapshot of the stress prevalence, causality could not be definitively confirmed. It is recommended that a longitudinal study be performed to investigate the real pattern and trend of stress among medical students.

One important finding of this study is that more attention be given to medical students during transitional periods: notably first, second and fourth years. At the same time, the third and final year medical students should not be neglected. One potential intervention programme that could be implemented to reduce stress levels of second and fourth year students is a structured orientation programme that addresses issues such as expectations for each phase, how the students are going to be evaluated, how to cope with study in each phase and how to get through each phase smoothly.

As expected, the top ten stressors (based on scores given by the medical students) were related to academic matters. The top ten stressors were tests and examinations, the large quantity of contents to be learned, lack of time to review what has been learned, poor marks, a desire to do well (self-expectation), insufficient skill in medical practice, falling behind in reading schedule, heavy workload, difficulty understanding the content, and inability to answer teachers' questions. Seven of the stressors were rated as causing moderate to high stress, and the other three stressors were rated as causing mild to moderate stress. This is in keeping with findings from other studies (3,5,8,33–34). The overall pattern of stressors in this medical school is similar to other medical schools (i.e., most of the top ten stressors were related to academic matters). However, the frequency (rank) of some stressors may be significantly different from studies done elsewhere (33–34).

In this study, the only significant factor impacting stress prevalence was the year of study. Other factors such as gender, race, religion, co-curriculum involvement, and academic achievement before entry, English, Physics and Biology results did not contribute to stress among medical students. This suggests that medical students' stress levels are significantly influenced by the year of study. This is in keeping with findings from other studies (2,10). However, Guthrie et al. (4) found that there was no significant association between stress level and year of study; however, they did report that the best predictor of psychological morbidity in the final year is the GHQ-12 score in the first year. This finding suggested that future intervention programmes in SMS, USM should be focused on the year of study.

In conclusion, the prevalence of stress among medical students in SMS, USM is high. There was a bimodal pattern of stress prevalence throughout the year of study. Academic-related problems were the major stressors among medical students. Year of study was the best predictor of a medical student's stress level.

## Author's contributions

Conception and design, data analysis and interpretation, drafting of the article: MSBY, AFAR, MJY
Critical revision and final approval of the article: AFAR, MJY.
Collection and assembly of data, obtaining of funding: MSBY

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