ORIGINAL ARTICLE

Prevalence of Burnout and Its Associated Factors among Medical Students in a Public University in Selangor, Malaysia: a Cross-Sectional Study

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ABSTRACT

Introduction: Burnout is a growing trend among medical students worldwide. The aim of this study was to determine the prevalence and factors associated with burnout among medical students at a public university in Malaysia. **Methods:** A cross-sectional study was conducted among 1st through 5th year medical students at a public university using a simple random sampling method in recruiting participants. In this study, The Maslach Burnout Inventory-General Survey for Student (MBI-SS) was used and burnout is defined as severely emotionally exhausted and severely depersonalised. **Results:** A total of 328 medical students were recruited with a with response rate of 88.6%. The burnout prevalence was 10.1%. Based on multivariate logistic regression, presence of smartphone addiction with adjusted (odds ratio (OR) 7.37, 95% confidence interval (CI) = 1.67, 32.49), course choice not based on personal interest or due to family pressure (OR 2.72, 95% CI = 1.08, 6.85) and the presence of family relationship problems (OR = 3.58, 95% CI = 1.27, 10.04) are more likely to be associated with burnout among the medical students. **Conclusion:** Our study has shown that every tenth medical students suffers from burnout. Medical students who are addicted to smartphone, have chosen medical course against individual interest or because of family pressure and have family relationship problems are at risk of getting burnout. Intervention is required to address this issue for the future well-being of medical students.
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INTRODUCTION

The International Classification of Diseases (ICD-11) describes burnout as a syndrome resulting from chronic work-related stress that has not been effectively managed, and ICD-11 does not classify it as a disease but included it as an occupational phenomenon (1). Burnout is a multidimensional entity characterised by high levels of emotional exhaustion (EE) and high levels of depersonalization (DP) (2). Research has shown that burnout can have both physical and psychological consequences for individuals(3). Physically, it can lead to persistent fatigue, headaches and even worsening of underlying chronic illnesses. From psychological point of view, it can interfere with sleep and other symptoms of mental illness. Burnout among medical students has been extensively studied worldwide and has been shown to predispose them to burnout later in their careers(3, 4). Medical school is different from other courses. The medical profession is one of the most important professions in modern society, but the course is long, emotionally demanding, challenging and competitive (4). Burnout prevalence among medical students varies

between countries, ranging from 10.3% to 67.9% (5,6). Burnout is a problem for medical students due to stressful life as they are expected to learn, memorize and regurgitate large amounts of information within a short period of time (7, 8). In addition, medical students may encounter other problems such as financial problems or interpersonal relationships that can lead to burnout. Burnout has a tremendous impact on medical students, such as poor academic performance, low self-esteem, substance abuse, and the development of mental disorders and suicidal thoughts (8-11).

Based on a previous study, about 11% of medical students seriously consider dropping out of medical school each year, and burnout appears to be one of the contributing factors (9). Another large study conducted in the United States reported that 49.6% of medical students suffered from burnout and that 11.2% of burnout students had suicidal thoughts (12). Therefore, it is important to detect this detrimental problem earlier in order to take further action. Factors associated with burnout can be divided into sociodemographic and stressor factors (5,11-17). A local study reported that the prevalence of burnout among medical students was 67.9%, but this study did not assess other potentially associated factors other than socio-demographic factors (13). The prevalence of burnout differs between Western and Asian countries and this could be due to the fact that these two studies used different instruments to measure burnout. Dyrbye et al. (12) used the Maslach Burnout Inventory and Chin et al.(13) used the Copenhagen Burnout Inventory. Another possible reason for a higher burnout prevalence in Chin et al. may be due to the fact that only one domain is appropriate for diagnosing burnout in the Copenhagen Burnout Inventory compared to the Maslach Burnout Inventory, where two domains are required to make a burnout diagnosis. In the Maslach Burnout Inventory, a score of 27 or higher on the emotional exhaustion subscale or 10 or higher on the depersonalization subscale was considered an indicator of occupational burnout for healthcare professionals.

MATERIALS AND METHODS

Study design and study setting
A cross-sectional study was conducted at one of the public universities between April and August 2019. This public university is located near Serdang Hospital, Malaysia. It has a 5-year medical programme with the pre-clinical phase being the first two years of the programme during which students are taught a basic series of science courses. While the clinical phase occupies the remaining years of the programme, the students go through a total of eight major rotations within different departments of the hospital.

Study population and sample size calculation
The participants in this study consist of first to fifth year medical students. A simple random sampling procedure

based on a computer program generated table of random numbers was used to recruit participants. The sample size was calculated using the Lwanga and Lemeshow formula (20) based on the prevalence of burnout among male medical students of 0.512 and female medical student 0.352, respectively (21). The calculated sample size was 294 with 80% power and 5% error. The final sample size was 368 after accounting for the 20% non-response rate.

Study instruments
Participants were invited via Whapapps to answer the survey. They were given a link to a Google form with the following 4 sections: 1) Sociodemographics, 2) Stressors, 3) Maslach Burnout Inventory- General Survey (Student) (MBI-SS), 4) Smartphone Addiction Scale (SAS) Questionnaire. Prior to answering the online survey, participants were informed of the purpose of the study, their personal identifiable information was anonymized and their responses to the questionnaires were protected. In the first section, socio-demographic data such as gender, ethnicity, year of study repeater status, accommodation, parents' occupation and monthly household income of the family were collected. The second section collected information on burnout stressors such as course choice not based on personal interest or due to family pressure, relationship issues, family issues, number of hours of sleep most days of the past month, number of hours spent on smartphone most day of the past month, total number of merits collected, communication problems with friends, self-expectation for examinations and frequency of examinations.

The third section consists of the Maslach Burnout Inventory-General Survey for Student (MBI-SS). The MBI-SS is a self-administered questionnaire with 16 questions: five emotional exhaustion (EE) items, 5 cynicism (CC) items and 6 professional efficacy (PE) items. The score for each item was based on 6-point Likert-type scale ranging from 0 (never) to six (every day) in measuring frequency of a particular feeling. The minimum score is 0, and the maximum score is 96. The MBI scores identify the burnout profiles in terms of burnout, engaged, ineffective, overextended and disengaged (Table I). Burnout is defined as high EE and high CC. Engaged is defined as high score in PE but low score for EE and CC. Ineffective is defined when there is a low score in PE. Overextended profile is defined as a high EE. Disengaged is defined as a high score on CC. (7).

High exhaustion is calculated from the z score, mean and standard deviation. For example, High exhaustion (emotional exhaustion) at $z = mean + (SD * 0.5)$, High cynicism (depersonalization) at $z = mean + (SD * 1.25)$ and low professional efficacy (personal efficacy) at $z = mean + (SD * 0.10)$ (7). The reliability of the scales was good as Cronbach's alpha for EE was 0.74, CY=0.79 and PE=0.76 among students in a study in Spain; EE

was 0.80, CY=0.86 and PE=0.67 among students in a study in the Netherlands, and EE was 0.79, CY=0.82 and PE=0.69 among students in a study in Portugal (22).

Fourth section consists of 33 items of Smartphone Addiction Scale (SAS) Questionnaire. It is also a self-administered 6-point Likert scale. The minimum score is 33, and the maximum score is 198. Smartphone addiction is present when the score is greater than 98. This is a reliable and valid scale because Cronbach's alpha is 0.967 (23).

Operational definition

In this study, the dependent variables was the presence or absence of burnout. Burnout is defined as having a high score on EE and CC alongside a low score on PE. The accumulation of merits is defined as the number of points accumulated through participation in sporting, cultural or academic activities organized by the college, clubs, and university. Poor communication with colleagues and self-expectation in the examination is a matter of self-reporting and not using a questionnaire.

Statistical analysis

All data from questionnaires were analysed using IBM SPSS Statistic Version 25. Categorical data was expressed as a percentage or frequency. All the continuous variables data were reported as median and interquartile range (IQR) as the data was not normally distributed. For data analysis, the Mann-Whitney U test was used for continuous data that were not normally distributed. Multivariate logistic regression was used to determine the predictors of burnout. Variables with p<0.25 during univariate analysis were entered into multivariate logistic regression. The results were presented in adjusted odds ratios (aOR) and 95% confidence intervals (CI). A p-value less than 0.05 was considered statistical significance.

Ethical consideration

Letters of approval were obtained from Ethics Committee for Research Involving Human Subjects (JKEUPM) and Faculty of Medicine and Health Sciences, Universiti Putra Malaysia (Approval number: UPM/TNCPI/RMC/1.4.18.2).

RESULTS

A total of 328 medical students were recruited for the study with the response rate of 88.6%. The burnout prevalence among medical students in this study was 10.1%. Other MBI profiles showed that 25.9% medical students were "engaged", 57.6% were "ineffective", 31.7% were "overextended", and 11.9% were "disengaged" (Table I). The burnout prevalence among medical students with smartphone addiction was 14.4% compared to 3.1% without smartphone addiction. Two third (65.5%) of them were female and 46.3% were preclinical students.

Table I: Burnout profiles among medical students (n=328)

Burnout profiles/ domains	Emotional Exhaustion (EE)	Depersonalisation Cynicism (CC)	Personal accomplishment, Professional efficacy (PE)	N (%)
Burnout	High	High	-	33 (10.1)
Engaged	Low	low	High	85 (25.9)
Ineffective	-	-	Low	189 (57.6)
Overextended	High	-	-	104 (31.7)
Disengaged	-	High	-	39 (11.9)

Table II: Sociodemographic data and stressors among medical students(n=328)

Socio-demographic variables	N (%) /Median (IQR)
Gender, male	113 (34.5)
female	215 (65.5)
Ethnic Group, Malay	178 (54.3)
Chinese	78 (23.8)
Indian	66 (20.1)
Others	6 (1.8)
Year of Study, preclinical	152 (46.3)
clinical (3rd to 5th year)	176 (53.7)
Repeater, yes	19 (5.8)
no	309 (94.2)
Accommodation, in campus	304 (92.7)
Off Campus	24 (7.3)
Parents' occupation, medical	26 (7.9)
non-medical	302 (92.1)
Family monthly income in RM	5000 (5650)
Amount of merits collected in points	150 (123)
Duration of sleep for most of the days for the past one month in hours	6 (1)
Smartphone usage for most of the days for the past one month in hours	4 (3)
Smartphone addiction, yes	201 (61.3)
no	127 (38.7)
Relationship Status, single	258 (78.7)
in a relationship	70 (21.3)
Family relationship problems, yes	33 (10.1)
no	295 (89.9)
Course choice against personal interest or under family pressure, yes	53 (16.2)
no	275 (83.8)
Poor communication among friends and lecturers, yes	45 (13.7)
no	283 (86.3)
High self-expectation in examinations, yes	182 (55.5)
no	146 (44.5)
Too many examinations, yes	183 (55.8)
no	145 (44.2)

Data are presented in either n(%) or median (IQR). RM: Ringgit Malaysia *USD1=RM4.2.

Table II shows socio-demographic and stressors of the respondents. More than half (54.3%) were Malays, 94.2% were non-repeaters, 92.7% remained on campus and family's monthly household income was RM 5000(5650). More than three-fifth (61.3%) of medical students are addicted to smartphones. Table III shows the association between socio-demographic factors and

Table III: Association between burnout,socio-demographic and stressors among medical students using univariate analysis (n=328)

Variables	Burnout		p-value
	Absent	Present	
Gender, male	98 (86.7)	15 (13.3)	[a]0.161*
female	197 (91.6)	18 (8.4)	
Ethnic Group, Malay	160 (89.9)	18 (10.1)	[a]0.554
Chinese	72 (92.3)	6 (7.7)	
Indian	57 (86.4)	9 (13.6)	
Others	0 (0)	6 (100)	
Year of Study, preclinical	130 (85.5)	22 (14.5)	[a]0.014*
clinical	165 (93.8)	11 (6.2)	
Repeater, yes	18 (94.7)	1 (5.3)	[a]0.474
no	277 (89.6)	32 (10.4)	
Accommodation, in campus	274 (90.1)	30 (9.9)	[a]0.680
off campus	21 (87.5)	3 (12.5)	
Parents' Occupation, medical	23 (88.5)	3 (11.5)	[a]0.794
non-medical	272 (90.1)	30 (9.9)	
Family monthly income	5000 (5700)	5000 (5500)	[b]0.937
Number of merits collected in points	140 (134)	200 (100)	[b]0.214*
Duration of sleep for most of the days for the past one month in hours	6 (1)	5 (2)	[b]0.295
Smartphone usage for most of the days for the past one month in hours, mean ± SD	4 (3)	5 (5.5)	[b]0.150*
Smartphone addiction, yes	172 (85.6)	29 (14.4)	[a]0.001*
no	123 (96.9)	4 (3.1)	
Relationship Status, single	231 (89.5)	27 (10.5)	[a]0.640
In a relationship	64 (91.4)	6 (8.6)	
Family relationship problems, yes	26 (78.8)	7 (21.2)	[a]0.025*
no	269 (91.2)	26 (8.8)	
Course choice against personal interest or under family pressure, yes	43 (81.1)	10 (18.9)	[a]0.020*
no	252 (91.6)	23 (8.4)	
Poor communication among friends and lecturers, yes	36 (80.0)	9 (20.0)	[a]0.017*
no	259 (91.5)	24 (8.5)	
High self-expectation in examinations, yes	160 (87.9)	22 (12.1)	[a]0.173*
no	135 (92.5)	11 (7.5)	
Too many examinations, yes	157 (85.8)	26 (14.2)	[a]0.005*
no	138 (95.2)	7 (4.8)	

*Variable with p<0.25 entered multiple logistic regression. [a] Chi-square test, [b] Mann-Whitney U test

burnout among medical students.

Table III shows association between burnout,socio-demographic and stressors among medical students using univariate analysis. Stressors that were significantly associated with burnout include number of merits collected, smartphone addiction, hours spent on the smartphone most day in the past one month, having family relationship problems, chose medical field because of family pressure and against individual interest, having poor communication among friends and lecturers, high self-expectation in examinations and having too many examinations.

Table IV shows the result of multivariate logistic regression in examining the determinants of burnout. In multivariate logistic regression analysis, presence of smartphone addiction (Odd ratio (OR) 7.369, 95% confidence interval (CI) = 1.671, 32.491) having problems with family relationships (OR 3.578, 95% CI = 1.274, 10.044) and choosing medical field against individual interest or due to family pressure (OR 2.719, 95% CI = 1.079, 6.853) were the determinants of burnout among medical students.

DISCUSSION

Our study found out 10.1% of medical students suffered from burnout. This is similar to another study conducted in Brazil based on the same questionnaire, and the

Table IV: Predictors of burnout among medical students using multiple logistic regression (n=328)

Variables		Adjusted OR	95% C.I.		P-value
			Lower	Upper	
Gender	Male	1.401	0.59	3.324	0.445
	Female	1			
Year of Study	Pre-clinical	1.925	0.774	4.789	0.159
	Clinical	1			
Smartphone addiction	Yes	7.369	1.671	32.491	0.008*
	No	1			
Family relationship problems	Yes	3.578	1.274	10.044	0.016*
	No	1			
Choice of medical field against interest or family pressure	Yes	2.719	1.079	6.853	0.034*
	No	1			
Poor communication among colleagues and lecturers	Yes	0.846	0.301	2.378	0.752
	No	1			
High self-expectations in examinations	Yes	1.077	0.448	2.585	0.869
	No	1			
Too many tests / examinations	Yes	0.741	0.268	2.052	0.565
	No	1			
Smartphone use for most of the days for the past month in hours		1.081	0.979	1.193	0.124
Number of merits accumulation		1	0.994	1.006	0.979

Note: *Significant level at p<0.05

reported prevalence of burnout was 10.3% (5). Another study conducted in Brazil mentioned that 14.9% of the medical students suffer from burnout, but the MBI-Human Service Survey (MBI-HSS), which has different questions and domains compare with MBI-SS that used in our study(11). The MBI-HSS was designed for respondents who work in a specific field, requiring them to meet doctors and nurses even though their population includes medical students who are currently in their first through eighth semesters. On the other hand, our study using the MBI-SS is specificall designed for student and focuses on the academic aspects. Other factors contributing to such a prevalence in our study would be the time frame of the data collection. Apparently most of the students were not busy with their studies and assignments, with the exception for the first and fifth year students who had just finished their first and third professional examination, respectively.

A local study by Chin et al. showed that 67.9% of the medical students at Universiti Sains Malaysia (USM) suffered from burnout (13). This is a big difference compared to our study's result. We believe that this is due to a difference in the study instrument used, which in the USM study was Copenhagen Burnout Inventory (CBI). MBI measures the three dimensions of emotional exhaustion, cynicism and professional efficacy whereas CBI measures personal, work or client-related burnout. The possible reason for a higher burnout prevalence in Chin et al. may be due to the fact that only one domain is appropriate for diagnosing burnout in the Copenhagen Burnout Inventory compared to the Maslach Burnout Inventory, where two domains are required to make a burnout diagnosis. In the Maslach Burnout Inventory, a score of 27 or higher on the emotional exhaustion subscale or 10 or higher on the depersonalization subscale was considered an indicator of occupational burnout for healthcare professionals.

For the other types of MBI profiles, more than half of the students (57.6%) suffered from the ineffective profile, followed by a third who suffered from the overextended (31.7%), while a quarter were in the engaged profile (25.9%), and a tenth had disengaged (11.9%). It was found that a person with symptoms of burnout may be demotivated or overworked, but not all individuals who are disengaged or overextended suffered from burnout. These non-burnout categories (ineffective, overextended, and disengaged) need further follow-up because of their consequences that could likelt affect the students in their future performances as medical professionals. Ineffective students are characterized by a loss of confidence in their own abilities, which can lead to incompetence. A study showed that students with low self-esteem perform poorly in school (24). However, that study also found that poor academic performance can also result from overconfidence when students overestimate their academic abilities. Therefore, the level of trust should be maintained at the required level to benefit them in the near future. Overextended or overwhelmed students suffer fromfatigue due to long hours studying and completing assignments. This finding is consistent with a study in which medical students felt pressured to perform well during their medical school (25). A disengaged profile means that the students are detached from their environment. We believe that these students are having fewer social interactions because they are engaged in their studies and preparing for upcoming examinations. This study also mentioned that some of the participants were spending their time engaging in recreational activities, but at the same time, felt uncomfortable in the sense that they should have used that time to study (26). They felt that wasting time on activities unrelated to their medical studies could

jeapardize their academic performance. Therefore, some of them choose to let go of the things they used to enjoy in order to focus more on their studies.

Our study reported that smartphone addiction is one of the significant factors associated with burnout. Our study also reported that the prevalence of smartphone addiction among medical students in this public university was 61.3%. The burnout prevalence among medical students with smartphone addiction was 14.4% compared to 3.1% without smartphone addiction. This high prevalence of burnout among medical students with smartphone addiction could be due to the high levels of emotional exhaustion and depersonalization experienced. High levels of emotional exhaustion could be due to poor sleep quality, as smartphone use can increase insomnia and fatigue among users. The bright light and electromagnetic waves emittedby the handphone can affect sleep quality as it can affect the brain's psychological function(27). Nightime smartphone use can also lead to daytime fatigue, which can lead to excessive exhaustion, which can lead to excessive exhaustion, which can eventually lead ot burnout. Excessive use of smartphones can lead to an increase in the incidence of depression and anxiety. Smartphone addiction can lead to social withdrawal as one chooses virtual life as over real life as a viable means of escaping reality (28). This behaviour can then contribute to a high levels of depersonalization and possible burnout.

Choosing a course that was against the student interest or because of family pressure also contribute significantly to burnout in this study, as indicated by high levels of emotional exhaustion and depersonalization. Other studies also found this type of pattern. A study of 413 medical students in Cameroon by Nijm et al. found an association between students who regretted their choice of medical studies and burnout syndrome (p<0.001) (29). In addition, the study found an association between students considering dropping out of medical school and an uncomfortable feeling about medical studies with the burnout syndrome. This is because medical students who are uncomfortable with medical courses would rescind their course as they felt academically ineffective (29-31).

This factor is also considered relevant in studies with other professionals group in medical field. A study of nursing students showed that there is an association between regret about the choice of academic course and burnout syndrome (29). According to a study by Tian et al. of 1814 neurology postgraduates in China, it was reported that 46.6% regretted their choice of career, and career choice regret is the strongest risk factor for burnout syndrome (OR = 3.17, 95% CI 2.33–4.32) (32). Asian families are still very rigid in their children's studies and may directly or indirectly force their children to pursue medical-related courses as this mostly guarantees a better future (33). This increases the

risk of burnout as the child may regret pursuing a course that was more appreciated by their parents rather than themselves. This fact is further verified by a 2018 study in India, which found that about 40% of medical students regretted having chosen the medical profession out of respect for their elders (34).

Surprisingly, the merit system was not one of the factors associated with burnout among medical students. The possible explanation for this finding may lie in the simultaneous start of the semester break during the data collection period. Most of the students were also not burdened with the extracurricular activities since the semester was over, the merits book was submitted, and thus merit collection was no longer necessary. Medical student burnout is an important fact with potentially serious consequences for the health of the medical students concerned and those with whom they interact and connect because it is associated with an erosion of professionalism and as well as personal consequences. There are associations between burnout of medical students and reduced ethical strength (honesty and integrity) and empathy, increased unprofessional behaviour, the risk of dropping out, and suicidal thoughts (2). From now on, several methods can be suggested to help manage the burnout stressors. Some methods that have been proposed are strategies that focus on the engagement process, such as positive reflection, problem solving skill and expression of emotion that help students to adapt better to reduce anxiety and depression that could impact the students' mental integrity and physical well-being (10,35&36). Extracurricular activities, particularly involving those involving music and physical exercise, have been shown to reduce stress and burnout levels in medical students, which may be why merit collection is not a significant stressor for these students since most of these activities involve these aspects. Students tend to be happier to indulge in them and not see them as a burden (10).

As an organizational strategy, the continuous recording of mental health outcomes over the entire duration of medical school could play an important role, which has previously shown a significant reduction in burnout among medical doctors (37). The family, educational, and clinical settings should focus on change to reduce avoidable stressors and create more favourable teaching and clinical practice (38).

This study had some limitations. First, the questions on poor communication with peers and self-expectancy on the examination were answered based on a self-report and not using a reliable or valid assessment tool. Second, we did not capture information on sleep disorders, sleep quality, internet addiction, excessive fatigue, symptoms of depression and anxiety, and also social withdrawal. These factors can have an impact on burnout. Therefore, the findings of this study should be interpreted with caution. Despite with the limitations, this is the first study to correlate smartphone addiction

and burnout among the medical students in Malaysia.

CONCLUSION

Around a tenth of medical students are affected by burnout. The determinants of burnout were having smartphone addiction, family relationship problems, and choice of medical specialtydue to family pressures and against individual interests. Therefore, academic advisors and mentors should be more vigilant and identify students at risk of burnout early so that they can be referred for counselling and other interventions to ensure the well-being of the medical students.

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