ORIGINAL ARTICLE

Prevalence and Associated Factors of Depression, Anxiety and Stress Among Doctors in North Borneo

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ABSTRACT

Introduction: Doctors are known to deal with high occupational stress, causing increased risk of depression, anxiety and stress.Nevertheless, the prevalence and associatedfactors of depression, anxiety and stress among registered doctorsworking in 24 public hospitals in Sabah, Malaysia are not known yet. **Methods:** This cross-sectional study was conducted using convenient sampling from September-October 2018. The data of 21-item Depression Anxiety Stress Scale (DASS-21) was collected via online link anonymously. **Results:** Among 314 doctors, majority of them were females (62.1%), mean age 29 (SD 2.72), non-Sabahan (82.8%), Malays (46.8%), not married (78.3%) and medical officers (93.6%). Prevalence of severe/extremely severe anxiety symptoms was 27.4%,depression (22.9%) and stress (18.5%). Doctors perceiving themselves to be depressed, anxious and/or stressed were more likely to develop the corresponding symptoms. Females and Chinese were twice more likely to report anxiety symptoms. Being married had protective effect against depressive symptoms, while working in same hospital for longer time had a significant but weak protective effect against anxiety and stress symptoms. **Conclusions:** Mental health issue among doctors is substantial and need to be addressed effectively for the benefit of their life, patients and country.

Keywords: Anxiety, Depression, Mental health, Stress, Doctor

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INTRODUCTION

Medical profession has been known to exert high-level of occupational stress that may cause burnout among doctors (1). Psychological problems among doctors are a world-wide phenomenon that has been substantiated by numerous studies across the globe (2, 3). Doctors in negative emotional state have higher risk of developing depression or anxiety that can lead to poor clinical judgment and medical errors, affecting patients' safety (1). Psychological problems among doctors may also affect both therapeutic relationship and working relationship between colleagues. Nevertheless, this issue is often overlookedas doctors are usually reluctant to disclose their psychological problems due to stigmatization of mental illness and repercussion of having their license revoked (4), which has made detection difficult and potentially results in detrimental effect to the healthcare service.

Fully registered medical practitioners (5) are at the frontline of patients' management. Measures taking

care of their mental wellbeing need to be in place. It is imperative to identify the presence of psychological problems among practicing doctors at an early phase so that interventions can be executed to tackle the problem at its roots. In the context of Malaysia, a study on prevalence of occupational stress among doctors in Hospital Kuala Lumpur (HKL) had shown that 40.4% doctors are dealing with occupational stress and had found that doctors below the age of 30 experienced stress more than the other age group (6). This is followed by few other studies looking into doctors in emergency department, assistant medical officers and house officers (7-9).

Sabah is the second largest Malaysian states with 73,619 square kilometres that is located off the east coast of Borneo Island. It consists of five divisions subdivided into 23 districts and there are a total of 24 government hospitals in Sabah under the State Health Department with an estimated population of 1,800 registered medical doctors. Having the highest percentage of population experiencing psychological problems among all Malaysian states, which is 42.9% (10), there is no official data on the psychological problems experienced by the doctors who are taking care of the residents. Hence, this study was conducted to estimate prevalence

of depression, anxiety and stress among registered doctors in government hospitals of Sabah.

MATERIALS AND METHODS

Samples
This is a multicentre cross-sectional study that was conducted from 21 September until 21 October 2018. The inclusion criteria was fully registered clinical doctors working in Sabah Ministry of Health hospitals; including medical officers, specialists and consultantswho provide direct diagnosis, treatment, or care for the patients. Doctors who are on leave for the past two weeks before questionnaire submission were excluded.A total of 268 responses were required to achieve power of 0.80 at a significance level of 0.05, with an approximate effect size of 0.286 based on previous similar studies (9) in an estimated population of 1,800 medical doctors in Sabah. The sample size was calculated using the sample size calculator for prevalence study (11). A total of 355 responses were received from 7 tertiary and 17 district hospitals with 314 responses included for analysis.

Procedure
This study had been approved by Medical Research Ethics Committee (MREC), Ministry of Health, Malaysia (NMRR-18-1785-42827).Anonymous online questionnaires link prepared using Google Form in English language was disseminated to all doctors through Head of Departments and Chief Medical Officers in every hospital. The questionnaires comprised of demographic profile form, 21-item Depression Anxiety Stress Scale (DASS-21) and additional few open-ended questions. A pilot study was carried out among 14 doctors in one of the centre two weeks prior, to test out the feasibility of online data collection method. The respondents were given an overview of study information, objectives and study rationale before agreeing to participate by signing an electronic consent. Contact information for psychiatric assistance was provided.

Methods
The respondents were assessed using Depression Anxiety Stress Scale-21 (DASS-21). DASS-21 is a shorter version of a self-administered questionnaire of the original 42 items DASS. The instrument is a screening tool meant to measure negative emotional state in three subscales namely depression (low mood, motivation, self-esteem), anxiety (physiological arousal, perceived panic, fear) and stress (tension, irritability). The respondents indicate on a 4-point Likert scale the extent to which each of 21 statements applied over the past week. Higher scores on subscale shows increasing severity of depressive, anxiety and stress symptoms. Subscale scores are converted to the DASS normative data by multiplying total scores by 2. Internal consistency for each subscale is typically high, Cronbach's alpha of 0.96 to 0.97 for DASS-Depression, 0.84 to 0.92 for DASS-Anxiety, and 0.90 to 0.95 for DASS-Stress. (12-16).

A demographic profile form in English language was also developed, particulars were obtained on age, gender, ethnicity, marital status, medical illness, state of origin, current position/working place/department, duration of working in current position/hospital/Sabah, working hours per week, on call hours and perceived depression, anxiety and stress.

Statistical analysis
Descriptive statistical analysis and univariate logistic regression were performed followed by multiple logistic regression to determine the association between selected risk factors and symptoms of depression, anxiety and stress. During analysis, participants are deemed to possess symptoms of any of the subscales (depression, anxiety, stress) if they scored at least 'Mild' symptoms in the associated subscale. All statistical tests were set at 95% confidence interval.

For the analysis models in each of the 3 subscales, goodness of fit was confirmed with Hosmer-Lemeshow test (p-value >0.05 across all 3 subscales) and area under ROC curve (>0.7, p-value <0.001 across all 3 subscales). No multicollinearity was detected. No interactions were identified across all subscales.

Outliers identified in the 'Working hours/week' variable were not plausible as there are only 168 hours in a 7-day week, with an estimated 45-hour working week. Given anonymity in responses, it is not possible to investigate the cause of these outliers. Even so, they remain relevant in representing the burden of working hours for respondents as a hypothesized factor in developing symptoms of depression, anxiety and/or stress. As such, outlier observations were retained, undergoing winsorization but only at 1st and 99th centile to minimise bias. Any missing values encountered are not replaced. All data analyses were done using Statistical Package for Social Sciences (SPSS) version 22.

RESULTS

Demographics
Out of 355 responses received, 41 of them were excluded as they did not fulfil inclusion criteria. The final responses were 314 clinical doctors (Fig. 1). Total numbers of responses from tertiary and district hospitals were equally represented.

Table I shows the majority of respondents were female (62.1%), non-Sabahan (82.8%), Malay (46.8%), not married (78.3%) and medical officers (93.6%). Slightly more than half are in medical-based department (53.5%).Mean age of doctors was 29 years with a standard deviation of 2.72 years. 12.7% doctors had underlying medical illness. The median duration of working in Sabah was 16 months, in current position was 12 months and in current hospital was 11 months. The
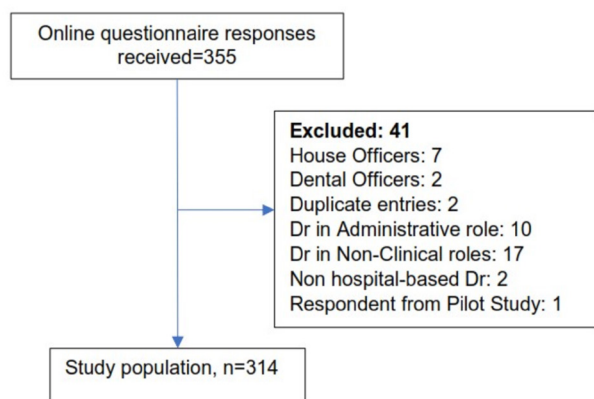
Figure 1: Flow of study

Table I: Demographic characteristics of clinical doctors (n=314)

Characteristics	n (%)	Mean (SD)	Median (Q1, Q3)
Age (years)		29 (2.72)	
Female	195 (62.1%)		
Non-Sabahan	260 (82.8%)		
Known medical illness	40 (12.7%)		
Ethnicity			
Malay	147 (46.8%)		
Chinese	85 (27.1%)		
Indian	47 (15.0%)		
Others	35 (11.1%)		
Marital status			
Not Married	246 (78.3%)		
Married	68 (21.3%)		
Hospital			
Tertiary referral	160 (50.9%)		
District	154 (49.1%)		
Department			
Medical-based*	168 (53.5%)		
Surgical-based+	45 (14.3%)		
District^	101 (32.2%)		
Position			
Medical Officer	294 (93.6%)		
Specialist/Consultant	20 (6.4%)		
Duration of working (months)			
In Sabah			16 (6, 36)
In current position			12 (6, 23)
In current hospital			11 (6, 21)
Working hours			
Working hours/week			60 (45, 72)
Working on call system	284 (90.4%)		
On call hours/month			96 (40, 140)
Perceived			
Depression	91 (29.0%)		
Anxiety	105 (33.3%)		
Stress	204 (64.8%)		

Note : Categorical data presented as frequency (%). Numerical data presented as mean (SD) if normally distributed and median* (Q1, Q3) if skewed
*Medical based includes anaesthesiology, cardiac anaesthesiology, cardiology, dermatology, emergency and trauma, family medicine, general medicine, neurology, outpatient department, paediatric cardiology, paediatrics, psychiatry, respiratory, wound care and stoma unit
+Surgical based includes cardiothoracic surgery, ENT, general surgery, neurosurgery, obstetrics & gynaecology, ophthalmology, orthopaedics, sports medicine
^Staff in district hospitals rotate between departments

average working hours per week was 60 hours. 90.4% of doctors were working on call system, with median hours on call was 96 hours. Respondents were asked on perceived depression, anxiety and stress with questions 'Do you think you are depressed/anxious/stressed?'. Among all respondents, 64.8% of them perceived that they are stressed out, followed by anxiety (33.3%) and depression (29.0%).

Around half of respondents reported at least mild symptoms in one of the three subscales, with the highest prevalence of severe and extremely severe symptoms being anxiety, followed by depression and stress (Table II).

Table II: Severity of depression, anxiety and stress symptoms (n=314)

Severity	n (%)		
	Depression	Anxiety	Stress
Normal	152 (48.4)	154 (49.0)	176 (56.1)
Mild	36 (11.5)	46 (14.6)	40 (12.7)
Moderate	54 (17.2)	28 (8.9)	40 (12.7)
Severe	21 (6.7)	28 (8.9)	41 (13.1)
Extremely Severe	51 (16.2)	58 (18.5)	17 (5.4)

Simple Logistic Regression

Simple logistic regression analysis in Table III suggests various factors associated with developing symptoms of depression, anxiety and/or stress. Being married suggests a possible protective effect on depression (OR 0.4, 95% CI [0.23-0.70]), anxiety (OR 0.57, 95% CI [0.33-0.98]) and stress (OR 0.38, 95% CI [0.21-0.70]). It is interesting to note that doctors who think that they are depressed have almost 14 times the risk of developing depressive symptoms as compared to those who do not think so (OR 13.89, 95% CI [6.80-28.37]). This finding is similar for perceived anxiety (OR 5.96, 95% CI [3.45-10.29]) and stress (OR 9.35, 95% CI [4.98-17.55]).

Multiple Logistic Regression

Multiple logistic regression of the depression subscale (Table IV) suggests that those who perceive themselves depressed were about 15 times more likely to report depressive symptoms (adj. OR 14.96[95% CI: 7.10, 31.52]),but there was a protective effect against developing depressive symptoms in doctors who were married (adj. OR 0.43 [95% CI: 0.21, 0.87]). The length of time one worked in their current position did not significantly influence onset of depressive symptoms.

Multiple logistic regression of the anxiety subscale (Table IV) revealed that females were 2.5 times more likely to report at least mild anxiety symptoms compared to males (Adj. OR 2.5 [95% CI: 1.45, 4.32]), while doctors of Chinese descent were about two times more likely to develop anxiety symptoms (Adj. OR 2.19 [1.21, 3.97]). Respondents having underlying medical illness did

Table III: Factors associated with symptoms of depression, anxiety and stress (using simple logistic regression)

Variables	Depression symptoms	Anxiety symptoms	Stress symptoms
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Age	0.92 (0.85, 1.01)	0.91 (0.83, 0.99)*	0.93 (0.85, 1.01)
Female	2.04 (1.28, 3.24)*	2.45 (1.53, 3.916)*	2.07 (1.29-3.33)*
Non-Sabahan	1.39 (0.77, 2.51)	1.48 (0.82, 2.67)	1.69 (0.912, 3.13)
Underlying medical illness	1.33 (0.68, 2.61)	1.97 (0.99, 3.93)	1.89 (0.97, 3.72)
Ethnicity			
Malay	1.00	1.00	1.00
Chinese	0.75 (0.44, 1.29)	1.64 (0.95, 2.82)	1.18 (0.57, 1.96)
Indian	0.57 (0.29, 1.11)	0.84 (0.44, 1.63)	0.93 (0.48, 1.81)
Others	0.65 (0.31, 1.36)	0.69 (0.33, 1.47)	0.58 (0.26, 1.27)
Marital status			
Not married	1.00	1.00	1.00
Married	0.40 (0.23, 0.70)*	0.57 (0.33, 0.98)*	0.38 (0.21,0.70)*
Position			
Medical Officer	1.00	1.00	1.00
Specialist	0.76 (0.31, 1.90)	1.21 (0.49, 3.00)	2.03 (0.81, 5.11)
Working duration (months)			
In Sabah	0.99 (0.98, 0.998)*	0.98 (0.97, 0.99)*	0.98 (0.97, 0.99)*
In current position	0.98 (0.97, 0.997)*	0.98 (0.97, 0.99)*	0.98 (0.97, 0.99)*
In current hospital	0.98 (0.97, 0.997)*	0.97 (0.96, 0.99)*	0.97 (0.95, 0.99)*
Working hours			
Working hours/week	1.01 (0.99, 1.02)	0.99 (0.98, 1.01)	1.01 (0.99, 1.02)
Working on call system	0.79 (0.37, 1.68)	1.03 (0.49, 2.18)	0.65 (0.31, 1.38)
On call hours/month	0.99 (0.99, 1.00)	0.99 (0.99, 1.00)	1.00 (0.99, 1.003)
Perceived			
Depression	13.89 (6.80, 28.37)*		
Anxiety		5.96 (3.45, 10.29)*	
Stress			9.35 (4.98, 17.55)*

Note : *p < 0.05

not significantly influence the development of anxiety symptoms (Adj. OR 2.16 [95% CI: 0.98, 4.75]). Those perceiving themselves to be anxious were five times more likely to report at least mild anxiety symptoms (Adj. OR 5.00 [95% CI: 2.83, 8.84]). However, it was found that respondents who have worked longer in the same hospital have a significant but weak protective effect against developing anxiety symptoms (Adj. OR 0.98 [95% CI: 0.96, 0.99]).

Multiple logistic regression of the stress subscale (Table IV) showed that gender did not significantly influence presence of stress symptoms, (Adj. OR 1.63 [95% CI: 0.94, 2.81]) while those who have worked longer in the same hospital were found to have a significant but weak protective effect against the presence of stress symptoms (Adj. OR=0.97 [95%CI: 0.95, 0.99]). Doctors who perceived themselves being stressed were about 9 times more likely to report at least mild degrees of stress (Adj. OR 9.07 [95% CI: 4.76, 17.23]).

DISCUSSION

Sabah being the second largest state and one of the most populated states in Malaysia represent a significant challenge to healthcare workers here. A state which is mostly rural with more than two dozen hospitals, mostly without in-house specialist demands a dedicated, stable and resilient workforce. Mental health issues among medical practitioners are often minimized if not stigmatized (17). This study encompasses 314 out of 1800 registered medical practitioners in Sabah. Slightly more than half of respondents reporting at least mild depression and anxiety symptoms with close to 44% reporting at least mild stress. Our findings are similar to a study on house officers in Kota Kinabalu using the same tool, DASS-21 (7).

The prevalence rate of depression in Malaysia was estimated at 8 % to 12 % (18). Study has shown that healthcare workers such as doctors are at higher risk of suffering from depression (19). In terms of depression

Table IV: Multiple logistic regression of factors associated with symptoms of depression, anxiety and stress

Variables	Depression		Anxiety		Stress	
	Adj. OR[a] (95% CI)[b]	*p*-value	Adj. OR[a] (95% CI)[b]	*p*-value	Adj. OR[a] (95% CI)[b]	*p*-value
Female	-	-	2.50** (1.45, 4.32)	0.001	1.63 (0.94, 2.81)	0.081
Chinese ethnicity	-	-	2.19** (1.21, 3.97)	0.009	-	-
Married	0.43* (0.21, 0.87)	0.018	-	-	-	-
Underlying medical illness	-	-	2.16 (0.98, 4.75)	0.055	-	-
Duration working in current position (months)	0.99 (0.98, 1.00)	0.106	-	-	-	-
Duration working in current hospital (months)	-	-	0.98** (0.96, 0.99)	0.001	0.97** (0.95, 0.99)	0.001
Perceived depression	**14.96*** (7.10, 31.52)	<0.001	-	-	-	-
Perceived anxiety	-	-	5.00*** (2.83, 8.84)	<0.001	-	-
Perceived stress	-	-	-	-	9.07*** (4.76, 17.23)	<0.001

Note: * *p* <0.05, ** *p* <0.01, *** *p* <0.001
Adj. OR = Adjusted odds ratio
a = Backward likelihood ratio (LR) test
No significant interactions between independent variables in the final model in each subscale (Depression, Anxiety and Stress); No multicollinearity detected in each subscale
Model fit:
Depression subscale: Hosmer-Lemeshow test X^2=5.39, *p*-value = 0.716; Area under ROC curve ~ 0.77
Anxiety subscale: Hosmer-Lemeshow test X^2=4.49, *p*-value = 0.811; Area under ROC curve ~ 0.77
Stress subscale: Hosmer-Lemeshow test X^2=15.294, *p*-value = 0.054; Area under ROC curve ~ 0.78

subscale, our result agrees with other studies worldwide. The prevalence rates of depressive symptoms among doctors are particularly high, it ranged from 16%-65% (19-22). The differences in prevalence estimates are likely due to differences in sample sizes and measurement tools. When compared to local studies, our result of 52 % is higher than the studies conducted among house officers in Kota Kinabalu (43%) and emergency medical officers (11%) (7, 9). The outcome of our study is in keeping with the result of a study by Shahruddin et al (7),possibly due to similar healthcare system, study design, sample and case definition. Possible factors contributing to higher depressive symptoms in our study include a sample which is highly female and separated from family. A large majority of our respondents are single and non-Sabahan. Geographical challenges, high workload and working in remote districts without in-house specialists' support are among other stressors.

Risk factors for depression among general population are well researched (23). Medical practitioners as a population are exposed to additional risk factors specific to their occupation. Doctors are exposed to other stressors such as long working hours, challenges in career development and highly stressful working conditions (19, 24). Presence of negative emotional states among doctors are also related to inadequate coping skills and lack of social support (22). Depression among doctors will not only impair performance and lead to suboptimal patients' care, but it can also put doctors at risk of substance misuse and suicide (25).

Those suffering from depression are likely to have anxiety symptoms as well, the co-morbidity is as high as 60% to 70% (26, 27). The same is true among medical practitioners. Prevalence rates of anxiety among medical practitioners are as high as 29% to 44% (21, 28). Our study revealed that 51 % of the respondents reported at least mild anxiety symptoms. The prevalence rate is lower compared to study conducted in Dubai (57%) (29) and among house officers in Kota Kinabalu (64%) (7). 36% of our respondents suffered at least moderate anxiety symptoms. This is higher in relation to study the conducted among emergency medical officers (9). Our finding can be explained by our sample's disciplines heterogeneity. Surgical-based doctors (30, 31) and possibly doctors in district hospitals are at higher risk of psychological distress.

Our study revealed that close to 44 % of respondents reported of being stressful (mild, moderate and severe). This is higher as compared to other studies which reported only up to a third of doctors feeling stressful (32-34). The differences with other studies are likely secondary to healthcare system, resources and cultural variations. It is worth noting that both studies by Cohen et al and Saini et al were conducted among postgraduate residents in well-resourced teaching centres. Samples from both Cohen et al and Grunfeld et al were from specific medical-based discipline in tertiary centres. Our result is similar to a study conducted in Dubai (42%) (29). Prolonged stress may lead to burnout and is associated with various physical illness (35). When

left unaddressed, it leads to high attrition rate and reduced morale among healthcare workers (36). The impact of doctors' psychological well-being is not only at individual level, it is also at organizational level. Cost incurred by litigation due to medical errors, absenteeism (37) and presentism (38) may strain the already tight budgeted service.

Various studies have shown association between long working hours (30, 39) and surgical-based discipline (30, 31) with psychological distress. Conversely, our study did not show such associations despite reporting higher working hours per week than other international studies. We postulate that medical practitioners are more likely to minimize and less likely to attribute long working hours to psychological distress due to both self and society expectations that they are resilient enough to deal with it. However, Our study agrees that depression among doctors is equal between both gender (29, 40) and marriage is associated with lower depression rate among healthcare workers (41, 42). Life circumstances play significant role in depression. Non-biological risk factors for depression such as unequal power and low socioeconomic status are less likely to occur among female medical practitioners. Nature of the work and workload are similar between both genders. It is likely that marriage provides the necessary support structure and buffer to negative psychological state. In terms of anxiety, female respondents are twice more likely to report anxiety symptoms. This is in contrast with other studies reporting no significant difference between gender (29, 40) and another study (9) showed male medical officers having more anxiety symptoms. Our finding supports the general agreement that anxiety is more common among female than male due to biological factors, metacognitive and thought control strategies differences (43).

It is interesting to note that our respondents underestimated depression and anxiety symptoms experienced by them. While objective measurement suggests that half of the respondents are experiencing at least mild symptoms, only close to one third of respondents perceived themselves to have depression and anxiety. This might partly be explained by doctors' conscientiousness, personality and expectation of longer working hours as part of the profession (44) leading to possibly some degree of 'normalization' of symptoms. Barriers to self-disclosure and help seeking may be due to self-stigma, lack of understanding of support services (45) and disclosure impact to career progression.

Interpretations of our findings should take into account of the limitations. Firstly, convenient sampling limits the study representativeness as higher responds will be obtained from those who are motivated or interested to participate in this study while leaving out those with severe symptoms. Doctors who did not check their emails or did not receive the study flyers would be left out as well. Secondly, DASS-21 is not a diagnostic tool and it only measures negative emotional states in a dimensional way rather than categorical diagnostic context (12). The prevalence of depression and anxiety cannot be accurately estimated. Thirdly, the potential causal factors are not elucidated due to the limitation of study design. In order to identify the potential cause that can guide higher level policy change, a mixed quantitative and qualitative longitudinal study on the different aspect of working environment will help to give a clearer picture on the experience of doctors, especially those with psychological problems.

CONCLUSION

With substantial doctors experiencing depression, anxiety and stress, it is essential to develop support structure that can help the doctors to seek help without being stigmatised. Ultimately, healthy doctors are needed for a healthy community.

ACKNOWLEDGEMENTS

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