

Original Article

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Prevalence and associated factors of depression, anxiety and stress among Malaysian adults: An analysis from One Health perspective

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ABSTRACT

Objective: To determine the prevalence of, and identify the factors associated with, depression, anxiety, and stress (DAS), separately among Malaysian adults.

Methods: An online based cross-sectional study was conducted among Malaysian adults from January to March 2021 comprising 499 participants. The SPSS software was utilized in data analysis. *Chi*-squared test of association and multiple logistic regression with a backward deletion strategy were performed to identify the factors associated with DAS, separately.

Results: The prevalence (95%*CI*) of DAS were 49.7% (45.2%, 54.2%), 49.3% (44.8%, 53.8%), and 24.5% (20.7%, 28.5%), respectively. Based on the results of multiple logistic regression analysis, there was significant interrelationship of DAS among respondents. Depression was significantly associated with anxiety [OR_{adj} (95%*CI*):13.8 (8.3, 23.0)] and stress [OR_{adj} (95%*CI*): 15.3 (5.8, 40.7)]. Anxiety was significantly associated with depression [OR_{adj} (95%*CI*): 12.3 (7.6, 20.1)] and stress [OR_{adj} (95%*CI*): 8.6 (3.6, 20.2)]. Stress was significantly associated with depression [OR_{adj} (95%*CI*): 12.7 (5.2, 31.4)] and anxiety [OR_{adj} (95%*CI*): 7.8 (3.4, 17.9)]. Additionally, age group of the respondents was significantly associated with anxiety. However, residence and marital status of the respondents were found to have significant association with stress.

Conclusions: DAS are highly prevalent among Malaysian adults. Appropriate community-based interventions should be undertaken in order to improve the mental health status, especially among youths, urban dwellers, and singles (or) unmarried persons. Further prospective studies should also be conducted to assess the directions of such disorders.

KEYWORDS: Anxiety; Depression; Stress; Malaysian adults; Malaysia

1. Introduction

Mental health is essential for everyone, all over the world. Global responses to mental health needs are inadequate and insufficient. Mental health is not merely an absence of mental disorders[1]. Mental health is defined by World Health Organization (WHO) as "a state of wellbeing in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her

Significance

Human health, animal health, and environmental health are interconnected, and mental health is influenced by more than just individual factors. This study also determined not only the high prevalence of depression, anxiety, and stress among Malaysian adults but also the factors associated with these illnesses. These findings could help in developing appropriate community-based interventions to improve the mental health status among Malaysian adults. This study may promote a comprehensive understanding of mental health by considering individuals within their broader social and ecological contexts.

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community"[2]. Mental health strongly influences the quality of life of a person. Poor mental health is associated with adverse health and socioeconomic consequences such as premature death, suicide, stigma, social exclusion, poverty, etc. Additionally, poor mental health is one of the neglected diseases in the world[1,2]. Hence, there is an urgent need for action on mental health. Identification of the risk factors is also important for promoting and protecting mental health of a community[3]. United Nations estimated that one in four people is going to experience a mental health condition in their lifetime, globally. In the global burden of disease, depression is ranked third, currently and is projected to rank first in 2030[4]. In Malaysia, mental health issues are increasingly prevalent because of rapid cultural and life style changes, resulting from urbanization and globalization[5]. So, the present study intended to determine the prevalence and associated factors of depression, anxiety and stress (DAS) among Malaysian.

Human health, animal health, and environmental health are interconnected, and mental health is influenced by more than just individual factors. This study may promote a comprehensive understanding of mental health by considering individuals within their broader social and ecological contexts.

2. Subjects and methods

2.1. Study design and participants

An online based cross-sectional study was conducted from January 2021 to March 2021. Epi-info version 7.0 was used in calculating the sample size. The prevalence of poor mental health among Malaysian adults was estimated at 43%[5] and absolute precision was set at 5%. The minimum requirement of the sample size was 377 at a 95% confidence level (*CI*). The present study utilized convenience sampling and online data collection due to COVID-19 pandemic. Any Malaysian adult (*i.e.*, 18 years of age or older) who was willing to participate voluntarily, and able to complete the online self-administered questionnaire, and never previously diagnosed with DAS, was eligible to take part in this study. An informed consent was obtained from every respondent before proceeding with the questionnaire. Anonymity and confidentiality were maintained.

2.2. Study design

The anonymous online self-administered questionnaire was developed by investigators using Google forms in two different languages, English and Bahasa Malaysia. It was distributed using personal contacts and *via* word of mouth using emails and messenger Apps such as WhatsApp, Messenger, Telegram, and other social media such as Facebook and Twitter. There were four main sections in the questionnaire, comprised of sociodemographic component (Section A), mental health assessment component (Section B), health related behaviors including binge eating habit (Section C), and assessment of internet addiction (Section D). Young's Diagnostic Questionnaire (YDQ)[6] was used to assess the internet addiction in this study. Five or more "Yes" responses to eight items of YDQ were considered as internet dependence[7]. Binge eating scale[8] was used to identify binge eating habits, which consisted of 16 items. Total scores ranged from 0 to 46 points. Severity of binge eating was categorized as minimal (less than 17 points), moderate (18-26 points) and severe (equal or more than 27 points)[9]. Mental health assessment was done by means of validated Bahasa Malaysia version of Depression Anxiety Stress Scale (DASS-21), which consisted of three subscales, namely, depression, anxiety, and stress. Each subscale contained seven items and finally, there were 21 items in the DASS-21[10,11]. The internal consistency was 0.84, 0.74 and 0.79, respectively, for depression, anxiety, and stress[12]. The participants were asked to use 4-point severity scales, ranging from 0 to 3 for each item, based on their experiences over the past week. The final score for the three subscales was obtained by multiplying the sum of the subscale scores by two. The depression levels of respondents were categorized as normal (0–9), mild (10–13), moderate (14–20), severe (21–27), and extremely severe (≥28); anxiety levels were classified as normal (0–7), mild (8–9), moderate (10–14), severe (15–19), and extremely severe (≥20); and stress was broken down as normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe (≥34)[10–12].

2.3. Data analysis

The SPSS software, version 23 was utilized. Both descriptive and inferential statistics were used in the study. Mean and standard deviation (SD) were measured for continuous quantitative variables, and frequency tables were drawn for categorical data. The prevalence and a 95% *CI* of DAS were estimated. *Chi*-squared test of association and multiple logistic regression with a backward deletion strategy were performed to identify the factors associated with depression, anxiety, and stress, separately. Any variable with a *P*-value of ≤ 0.25 in simple logistic regression analysis has been selected as a candidate variable to be included in the multivariate analysis.

2.4. Ethical approval statement

Ethical approval was obtained from the institutional ethical committee of AIMST University, Malaysia with the reference number of - FOM/SSM/2021/12.

3. Results

Out of 520 responses received, 21 were excluded due to incompleteness. The valid response rate was 499 out of 520 (96%). Finally, 499 respondents were included in the study. Their characteristics are shown in Table 1. Majority of the respondents were youths who were younger than 25 years of age (74.3%), females (63.1%), Malaysian-Indians (46.3%), urban-dwellers (85.2%), those living in Penang (26.9%), those with higher level of education (71.1%), singles (or) never married (83.8%), and unemployed (79.2%). Due to the relatively small number of respondents in some areas, the variable 'state' was recategorized into four different regions such as Northern (Perlis, Kedah, Penang, and Perak), Central (Selangor, Kuala Lumpur, and Negeri Sembilan), Eastern (Pahang, Terengganu, and Kelantan), and Southern (Melaka and Johor)[13].

Health risk behaviours such as smoking, alcohol consumption, drug

abuse, and binge eating, mental health status such as depression, anxiety, and stress, and internet addiction are shown in Table 2. The prevalence (95%*CI*) of DAS were 49.7% (45.2%, 54.2%), 49.3% (44.8%, 53.8%), and 24.5% (20.7%, 28.5%), respectively.

Table 1. Characteristics of the respondents [*n*(%)].

Variables	Frequency (n = 499)
Age-group	
< 25	371 (74.3)
25-39	60 (12.0)
40-62	68 (13.6)
Mean ± SD	26.7 ± 10.6
Sex	
Male	184 (36.9)
Female	315 (63.1)
Race	
Malay	115 (23.0)
Chinese	143 (28.7)
Indian	231 (46.3)
Others	10 (2.0)
Residence	
Urban	425 (85.2)
Rural	74 (14.8)
State	
Penang	134 (26.9)
Kedah	84 (16.8)
Johor	75 (15.0)
Perak	69 (13.8)
Selangor	61 (12.2)
Kuala Lumpur	24 (4.8)
Negeri Sembilan	22 (4.4)
Kelantan	10 (2.0)
Pahang	8 (1.6)
Malacca	5 (1.0)
Perlis	4 (0.8)
Terengganu	3 (0.6)
Region	
Northern	291 (58.3)
Central	107 (21.4)
Eastern	21 (4.3)
Southern	80 (16.0)
Education	
Lower (High school and lower levels)	144 (28.9)
Higher (University and graduates)	355 (71.1)
Marital status	
Never married	418 (83.8)
Ever married	81 (16.2)
Employment status	
Employed	104 (20.8)
Unemployed	395 (79.2)
Type of family	
Nuclear	326 (65.3)
Otherwise	173 (34.7)
Number of family members	
Less than 5	165 (33.1)
More	334 (66.9)
Mean ± SD	5.2 ±1.7
Income group	
≤ Median	250 (50.1)
> Median	249 (49.9)
Mean ± SD	5334.5 ± 7510.2 (ringgits)

Table 2. Health risk behaviours, internet addiction, and mental health status of the respondents [*n*(%)].

Variables	Frequency (n=499)
Smoking	
No	468 (93.8)
Yes	31 (6.2)
Alcohol consumption	
No	456 (91.4)
Yes	43 (8.6)
Drug abuse	
No	494 (99.0)
Yes	5 (1.0)
Binge eating habit	
Minimal	425 (85.2)
Moderate	52 (10.4)
Severe	22 (4.4)
Internet addiction	
Absent	314 (62.9)
Present	185 (37.1)
Depression	
Normal	251 (50.3)
Mild	72 (14.4)
Moderate	99 (19.8)
Severe	39 (7.8)
Extremely severe	38 (7.6)
Anxiety	
Normal	253 (50.7)
Mild	63 (12.6)
Moderate	72 (14.4)
Severe	29 (5.8)
Extremely severe	82 (16.4)
Stress	
Normal	377 (75.6)
Mild	40 (8.0)
Moderate	33 (6.6)
Severe	33 (6.6)
Extremely severe	16 (3.2)

The occurrence of DAS among respondents according to their characteristics are shown in Table 3. Some variables such as sex, residence, education, state, employment status, type of family, number of family members and income did not reveal any significance association with DAS at alpha 0.05 level. Although the association between age-group and depression was not statistically significant, the prevalence of depression showed a decreasing trend across age-groups. Aside from this, the association between age and the remaining two mental health issues (*i.e.*, anxiety and stress) was significant. This means that the older the age, the lower the prevalence of DAS. Similarly, the association between ethnicity (*i.e.*, race), and mental illness such as depression and anxiety was statistically significant whereas this association disappeared with stress. The variables 'region' and 'marital status' also influenced the prevalence of DAS.

The occurrence of DAS among respondents according to their health risk behaviours and internet addiction are shown in Table 4. Some health risk behaviours such as smoking and drug abuse did not show any significant association with DAS while the prevalence of DAS was consistently and significantly higher among alcoholics and those addicted to internet, compared to their counterparts. Binge eating habit was found to be significantly related to stress only. Moreover, the occurrences of DAS revealed a significant interrelationship among them (Table 5). This means that the presence of any form of mental illness imposes high risk of

developing another.

The multiple logistic regression analysis with a backward deletion strategy was applied to determine the factors associated with DAS, individually. The results are shown in Table 6. There was significant interrelationship of DAS among respondents. Depression was significantly associated with anxiety [OR_{adj} (95%*CI*):13.8 (8.3, 23.0)] and stress [OR_{adj} (95%*CI*): 15.3 (5.8, 40.7)]. Anxiety was significantly associated with depression [OR_{adj} (95%*CI*): 12.3 (7.6, 20.1)] and stress [OR_{adj} (95%*CI*): 8.6 (3.6, 20.2)]. Stress was significantly associated with depression [OR_{adj} (95%*CI*): 12.7 (5.2, 31.4)] and anxiety [OR_{adj} (95%*CI*): 7.8 (3.4, 17.9)]. Additionally, age group of the respondents was significantly associated with anxiety. However, residence and marital status of the respondents were found to have significant association with stress.

Table 3. Depression, anxiety and stress among respondents according to their characteristics [*n*(%)].

Characteristics (*n*)	Occurrence of		
	Depression	Anxiety	Stress
Age group, year			
< 25 (371)	193 (52.0)	204 (55.0)***	99 (26.7)*
25-39 (60)	26 (43.3)	24 (40.0)***	16 (26.7)*
40-62 (68)	29 (42.6)	18 (26.5)***	7 (10.3)*
Sex			
Male (184)	82 (44.6)	81 (44.0)	45 (24.5)
Female (315)	166 (52.7)	165 (52.4)	77 (24.4)
Race			
Malay (115)	73 (63.5)**	66 (57.4)*	34 (29.6)
Chinese (143)	60 (42.0)**	59 (40.6)*	28 (19.6)
Indian (231)	109 (47.2)**	114 (49.4)*	55 (23.8)
Others (10)	6 (60.0)	8 (80.0)	5 (50.0)
Residence			
Urban (425)	210 (49.4)	204 (48.0)	108 (45.4)
Rural (74)	38 (51.4)	42 (56.8)	14 (18.9)
State			
Penang (134)	64 (47.8)	63 (47.0)	30 (22.4)
Kedah (84)	38 (45.2)	36 (42.9)	15 (17.9)
Johor (75)	38 (50.7)	35 (46.7)	15 (20.0)
Perak (69)	30 (43.5)	32 (46.4)	15 (21.7)
Selangor (61)	37 (60.7)	37 (60.7)	16 (26.2)
Kuala Lumpur (24)	15 (62.5)	18 (75.0)	14 (58.3)
Negeri Sembilan (22)	14 (63.6)	14 (63.6)	12 (54.5)
Kelantan (10)	3 (30.0)	5 (50.0)	2 (20.0)
Pahang (8)	3 (37.5)	3 (37.5)	2 (25.0)
Malacca (5)	4 (80.0)	2 (40.0)	0 (0.0)
Perlis (4)	1 (25.0)	1 (25.0)	1 (25.0)
Terengganu (3)	1 (33.3)	0 (0.0)	0 (0.0)
Region			
Northern (291)	133 (45.7)*	132 (45.4)**	61 (21.0)***
Central (107)	66 (61.7)*	69 (64.5)**	42 (39.3)***
Eastern (21)	7 (33.3)*	8 (38.1)**	4 (19.0)***
Southern (80)	42 (52.5)*	37 (46.3)**	15 (18.8)***
Education			
≤ Secondary (144)	79 (54.9)	76 (52.8)	38 (26.4)
Tertiary (355)	169 (47.6)	170 (47.9)	84 (23.7)
Marital status			
Never married (418)	218 (52.2)*	225 (53.8)***	115 (27.5)***
Ever married (81)	30 (37.0)*	21 (25.9)***	7 (8.6)***
Employment status			
Employed (104)	43 (41.3)	38 (36.5)**	20 (19.2)
Unemployed (395)	205 (51.9)	208 (52.7)**	102 (25.8)
Type of family			
Nuclear (326)	155 (47.5)	152 (46.6)	72 (22.1)
Otherwise (173)	93 (53.8)	94 (54.3)	50 (28.9)
Number of family members			
Less than 5 (165)	73 (44.2)	69 (41.8)*	38 (23.0)
More (334)	175 (52.4)	177 (53.0)*	84 (25.1)
Income group			
≤ Median (250)	121 (48.4)	123 (49.2)	52 (20.8)
> Median (249)	127 (51.0)	123 (49.4)	70 (28.1)

*P< 0.05; **P<0.01; ***P< 0.001 based on the results of *Chi*-squared test.

Table 4. Depression, anxiety and stress according to the health risk behaviours, mental health status and internet addiction among respondents [*n*(%)].

Variables (*n*)	Occurrence of		
	Depression	Anxiety	Stress
Smoking			
No (468)	229 (48.9)	231 (49.4)	110 (23.5)
Yes (31)	19 (61.3)	15 (48.4)	12 (38.7)
Alcohol consumption			
No (456)	219 (48.0)	217 (47.6)*	101 (22.1)***
Yes (43)	29 (67.4)	29 (67.4)*	21 (48.8)***
Drug abuse			
No (494)	246 (49.8)	244 (49.4)	119 (24.1)
Yes (5)	2 (40.0)	2 (40.0)	3 (60.0)
Binge eating habit			
No (425)	206 (48.5)	203 (47.8)	95 (22.4)**
Yes (74)	42 (56.8)	43 (58.1)	27 (36.5)**
Internet addiction			
No (314)	141 (44.9)**	136 (43.3)***	65 (20.7)*
Yes (185)	107 (57.8)**	110 (59.5)***	57 (30.8)*

*P<0.05; **P<0.01; ***P<0.001 based on the results of *Chi*-squared test.

Table 5. The interrelationship of depression, anxiety and stress [*n*(%)].

Variables (*n*)	Occurrence of		
	Depression	Anxiety	Stress
Depression			
Absent (251)		43 (17.1)***	6 (2.4)***
Present (248)		203 (81.9)***	116 (46.8)***
Anxiety			
Absent (253)	45 (17.8)***		8 (3.2)***
Present (246)	203 (82.5)***		114 (46.3)***
Stress			
Absent (377)	132 (35.0)***	132 (35.0)***	
Present (122)	116 (95.1)***	114 (93.4)***	

*P<0.05; **P<0.01; ***P< 0.001 based on the results of *Chi*-squared test.

4. Discussion

The prevalence of depression (49.7%), anxiety (49.3%), and stress (24.5%) determined in this study were higher than those of a previous study done in Malaysia during 2019 in which the prevalence of DAS identified were 24.2%, 36.3% and 20.6%, respectively[14]. A similar study done in Ghana during 2018-2019 also revealed that the prevalence of DAS among adults were 25.2%, 53.3% and 9.7%, respectively[15]. However, a study conducted in Malaysia during 2021 reported that the prevalence of depression and anxiety among Malaysians during the third wave of COVID-19 pandemic were 87.7% and 43.6%, respectively[16]. These discrepancies may be due to the differences in sociodemographic and economic settings, and/or the study area (whether urban or rural), and/or the time of study (whether before or during the COVID-19 pandemic). The convenience sampling used in the present study might affect the representativeness of the samples. Moreover, the utilization of different measuring instruments (whether DASS21 or Patient Health Questionnaires for depression,

Table 6. The results of the multiple logistic regression analyses.

Variables	Depression	Anxiety	Stress
	OR_{adj} (95%*CI*)	OR_{adj} (95%*CI*)	OR_{adj} (95%*CI*)
Age-group			
< 25	-	1.0	-
25-39	-	0.4 (0.2, 0.9)*	-
40-62	-	0.2 (0.1, 0.5)***	-
Residence			
Urban	-	-	1.0
Rural	-		0.5 (0.2, 0.9)*
Marital status			1.0
Never married	-	-	0.3 (0.1, 0.9)*
Ever married	-	-	
Depression			
Absent	-	1.0	1.0
Present	-	13.8 (8.3, 23.0)***	15.3 (5.8, 40.7)***
Anxiety			
Absent	1.0	-	1.0
Present	12.3 (7.6, 20.1)***	-	8.6 (3.6, 20.2)***
Stress			
Absent	1.0	1.0	-
Present	12.7 (5.2, 31.4)***	7.8 (3.4, 17.9)***	-

*P<0.05, ***P<0.001, OR_{adj} (95%*CI*) = Adjusted odds ratio (95% *CI*).

and Zung's Self-Rating Anxiety Scale for anxiety) in the studies may also be responsible. The high prevalence of DAS found in this study could be due to the third wave of COVID-19 pandemic in Malaysia at the time of study. WHO also reported that the COVID-19 pandemic significantly increased the global prevalence of depression and anxiety[17].

The present study found the interrelationship (or) co-existence of DAS among respondents. It is consistent with the results of previous studies[15,18]. The biological link between DAS has already been discovered by the scientists at the University of Western Ontario[19]. The influencing factors identified in this study were age for anxiety, and residence, and marital status for stress. A similar study conducted in Iran revealed the significant association between DAS and age, sex, education, occupation, marital status, and country of birth[20]. Previous similar studies conducted in Malaysia and other countries identified not only the influencing factors of DAS but also the factors associated with help-seeking behaviour[18,21–24]. However, the present study focused only on the prevalence of and the factors associated with these mental illnesses. A Malaysian study also reported that an unpleasant working environment including abuse, bullying, harassment, and discrimination, as well as having too much workload were significantly associated with depression[22] while other studies[23,24] identified age, sex and family income as contributing factors to poor mental health status. The inclusion of different independent variables in the study and/or the differences in sociodemographic and economic contexts, and/or the study location (urban or rural) may account for the observed discrepancies.

The findings of the present study underscore the urgent need for heightened awareness and proactive intervention strategies to address the mental health issues among Malaysian adults.

5. Conclusions

DAS are highly prevalent among Malaysian adults. Appropriate community-based interventions should be undertaken in order to improve the mental health status, especially among youths, urban dwellers, and singles (or) unmarried persons. Further prospective studies should also be conducted to assess the directions of such disorders.

The following limitations should be kept in mind while interpreting the results. First, the present study relied on self-reported information; hence, the data may be subject to recall bias and reporting errors. Second, a causal relationship cannot be established in this study due to the utilization of a cross-sectional study design. Third, using non-random (or convenience) sampling would affect the representativeness of the samples included in the study. Therefore, the present study may not have good generalizability. Lastly, this study collected the data using online questionnaires, which might cause selection bias because people without internet access or those who did not use internet during the data collection were unable to participate.

Conflict of interest statement

The authors claim there is no conflict of interest.

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Data availability statement

The data supporting the findings of this study are available from the corresponding author upon request.

Authors' contributions

Maung TM, and Oo WM conceptualized and developed the study design, reviewed the literatures, analysed and interpreted the results of data analysis and writing the manuscript. Swa K and Win PTN took part in proposal development, led the data collection and data entry, took part in data analysis and interpretation, manuscript preparation and review. All read and approved the final version of manuscript.

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