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Psychological Distress Screening for Depression, Anxiety and Stress among Medical Ward Patients in Hospital Tapah, Malaysia: A Cross-Sectional Study Using The Depression, Anxiety and Stress Scale (DASS-21)

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Abstract:

Objectives: The mental health (MH) issue has emerged as one of the great public health concerns worldwide, and its prevalence is escalating substantially among Malaysians. An individual's daily living, physical health, and relationships can be hard-hit by an MH disorder. The present study aimed to (i) estimate the probable psychological distress in warded adult patients at Hospital Tapah, Malaysia, and (ii) investigate the key antecedents intrinsically linked to depression, anxiety, and stress that may precipitate psychological distress symptoms.

Material and Methods: This study was a cross-sectional questionnaire-based study involving 191 participants sampled from the warded adult patients at Hospital Tapah. The psychological distress was assessed using the Depression, Anxiety and Stress Scale-21 (DASS-21). Data were analysed by logistic regression using SPSS 16.0.

Results: Anxiety (34.0%) was detected as the highest prevalence of probable psychological distress by a wide margin, trailed by stress (16.8%) and depression (15.2%). Race, Orang Asli (native people) and mental health awareness were associated with the depression. Respondents who exercised regularly, were employed, non-smokers, non-alcoholic drinkers, and without mental health awareness were at risk of anxiety. Income was found to be significantly associated with stress.

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Conclusion: This study detected a two-fold increase in the risk of anxiety compared to stress and depression. Further studies should be conducted to identify the factors related to the high DASS-21 scores in detail.

Keywords: mental health, psychological distress, Depression Anxiety Stress Scales (DASS), patient care, health promotion

Introduction

The World Health Organization (WHO) defines mental health (MH) as "a state of well-being in which an individual realises their own abilities, can cope with normal life stresses, can work productively and fruitfully, and is able to contribute to the community".[1] MH disorder is one of the top global health concerns. Efforts to reach psychological resilience have been a stiff challenge to the medical community due to stigma against MH. MH has been a serious and growing issue in Malaysia for decades, with pervasiveness from 10.7% in 1996 to 29.2% in 2015 based on the National Health and morbidity survey (NHMS).[2] In 2011, the WHO Mental Health Atlas reported that 1.5% of Malaysian were treated in MH outpatient facilities.[3] Nevertheless, the MH problem nationwide goes unheeded, a situation which can be ascribed to the deprivation of routine psychological distress (PD) screening due to resource scarcities in Malaysia's MH services. 4 Note that a high level of PD is indicative of impaired MH.

The aging population who suffer from mental illness might be attributed to the chronic illness and the deficit of family support. In contrast, the antecedents of mental illness in the younger generation could be life challenges, drug abuse, domestic violence, etc. With an absence of a fitting instrument to authenticate the biochemical markers, MH disorder screening, diagnosis and monitoring depend on symptoms and clinical judgement.[5]

The Beck Depression Inventory (BDI), the Depression, Anxiety and Stress Scale-21 (DASS-21), the Patient Health Questionnaire 9 (PHQ-9), and the Hospital Anxiety and Depression Scale (HADS), to name a few, are standard assessment tools used in Malaysia for evaluating PD symptoms.[6] The DASS-21, in particular, is obtaining its share of utilisation in health services due to its ease-of-use with multiple languages. The key strength of the DASS-21 is rooted in its capability to assess clinical severity. Using the DASS-21, past research discovered that participants with rheumatological disorders and HIV had the highest prevalences of anxiety.[7,8]

The MH and mental disorders are not logged anywhere near the similar level of gravity as physical health. To the best of our knowledge, there is a paucity of studies investigating the stressors of MH disorders among warded patients in Malaysia. Therefore, the present study intended to (i) estimate the prevalence of probable PD among warded adult patients of Hospital Tapah by screening for the levels of depression, anxiety, and stress against the warded adult patients, and (ii) identify the factors associated with depression, anxiety, and stress in warded adult patients in Hospital Tapah. The validated DASS-21 was used.

Material and Methods

This research used a cross-sectional study conducted at the medical ward in Hospital Tapah for 6 months, from January 2018 until June 2018, the pre-Coronavirus (COVID-19) era. The DASS-21 is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. The DASS-21 uses a 4-point Likert

scale of 0 to 3 for measuring each question's severity effect. These numerical values are allotted to the participants' grading: 0=Did not apply to me at all, 1=Applied to me to some degree, or some of the time, 2=Applied to me to a considerable degree or good part of time, 3=Applied to me very much or most of the time. Based on the total score, the recommended cut-off scores for conventional severity labels (normal, mild, moderate, severe and very severe) are presented in Table 1.

Participants

During the 6 months, the male and female medical wards patients were recruited into the study by a convenience sampling method. Patients aged between 18-65 years old who could read and understand the Malay and English languages were considered for the study. The exclusion criteria were terminally ill patients, patients with a history of psychiatric illness, and illiterate patients.

The eligible candidates were requested to self-answer the DASS-21 questionnaire during bedside counselling or discharge dispensing after giving their preliminary consent. For candidates with difficulty using their upper or lower limbs, the researcher read the statement from the consent form and gained their approval before beginning the survey.

Participants were asked to complete the 21 questions in the DASS-21 questionnaire based on their feelings over the last week within 20 minutes. Each participant's DASS-21 score was subsequently filed and calculated accordingly (Table 1). The screening results were revealed to the participants before they underwent the pre-discharge process. The participants whose scoring mark evidenced probable depression, anxiety, and/or stress were provided a Mental and Physical Health Booklet 2012 for self-monitoring and alerting purposes. Meanwhile, those participants with severe and/or very severe scores were advised to make an

Table 1 Depression, Anxiety and Stress Scale-21 score calculation

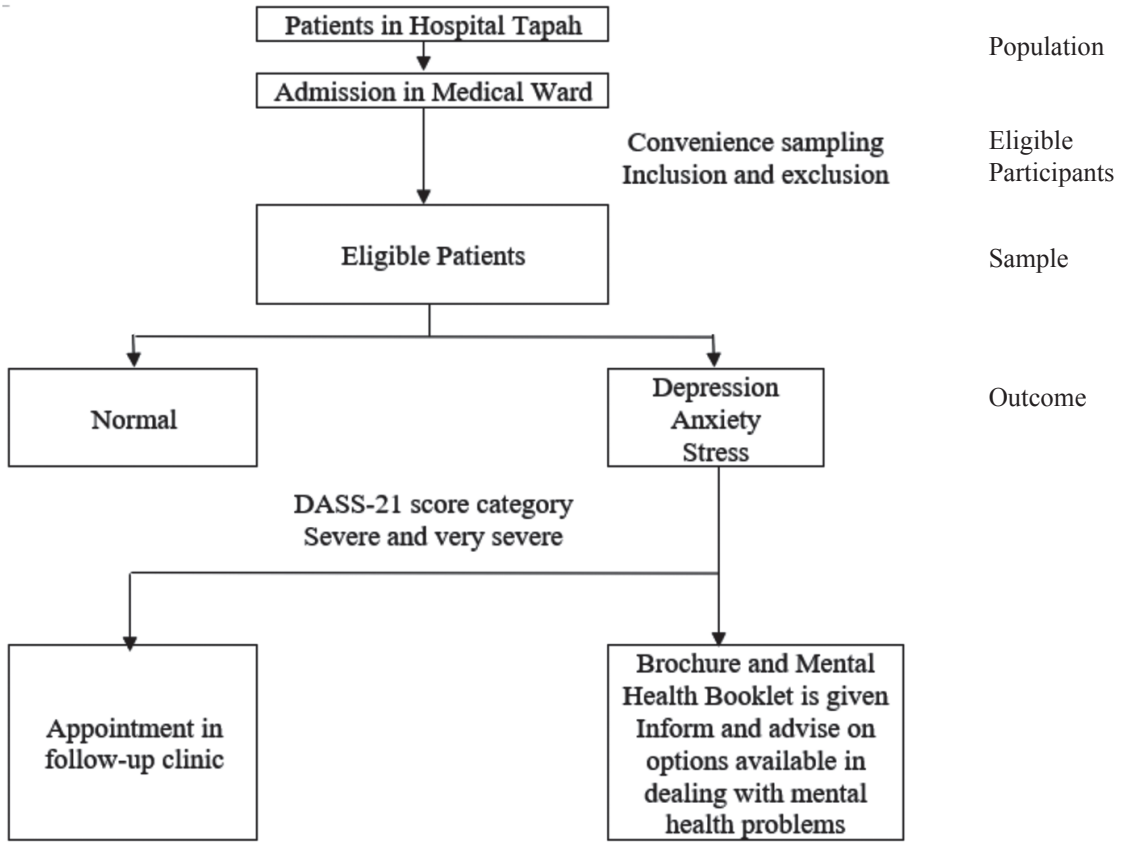
				Stress				
Question	Q1	Q6	Q8	Q11	Q12	Q14	Q18	Total
Score								
				Anxiety				
Question	Q2	Q4	Q7	Q9	Q15	Q19	Q20	Total
Score								
				Depression				
Question	Q3	Q5	Q10	Q13	Q16	Q17	Q21	Total
Score								

	Screening score		
	Depression	**Anxiety**	**Stress**
Normal	0-5	0-4	0-7
Mild	6-7	5-6	8-9
Moderate	8-10	7-8	10-13
Severe	11-14	9-10	14-17
Very severe	15+	11+	18+

initial appointment in the Follow-up Clinic in Hospital Tapah. It is necessary to remark that the participants reserved the right to decline to participate in the follow-up counselling session.

The conceptual framework used in this study is shown in Figure 1.

The sample size used in this study was determined using the Raosoft sample size calculator and the Universiti Sains Malaysia (USM) prevalence calculator subject to the 29.2% MH prevalence in NMHS.[2] To achieve a statistical power of 80.0% at a false positive rate of 0.05, a population of 7,200 (medical wards) patients in a 6-month period necessitated a sample size of 304 patients. Pre-testing of the data collection form was done to ensure the researchers collected all relevant data correctly. During the inclusion period, only 200 patients participated in the study due to a decreased number of ward admissions. Out of 200 participants, data from 191 participants were analysed as 9 participants were excluded due to incomplete responses. To provide useful results, a post-hoc power analysis was performed using the ClinCalc calculator. The findings obtained were compared with data (47.9%, 69.6%, and 62.9% in depression, anxiety, and stress, respectively) from a study with a similar setting (hospital patients with co-morbidities) and the desired power of over 80% was achieved.[9]



DASS-21=Depression, Anxiety and Stress Scale-21

Figure 1 Conceptual framework

The data obtained from the DASS-21 survey were analysed using the SPSS 16.0 program. Descriptive statistics were used to summarise the sociodemographic data. The DASS-21 scores were expressed as mean with standard deviation (S.D.); and frequency with percentage to define the prevalences of probable depression, anxiety, and stress in the warded patients. Any variables having a significant bivariate test at 0.25, a common variable entry criterion, were chosen as potential candidates for the multivariate model. Statistical differences between depression, anxiety, and stress in the warded patients were detected using a multivariate regression analysis at the 0.05 confidence level. Of note, mild to very severe conditions were clustered under one category for the data preceding the binary logistic regression.

This study was registered with the National Medical Research Register (NMRR) with registration number NMRR-17-2999-39085 and approved by the Medical Research Ethics Committee (MREC), Ministry of Health Malaysia. The participation was voluntary, and prior written consent was required using a bilingual Participant Information Sheet and Informed Consent Form especially created for the study. The data were analysed collectively in groups, and there were no identifiable data available in the publication.

The subjects were informed that participation was on a strictly voluntary basis. Questionnaires were distributed to the participants after the informed consent form was signed. All gathered data were confidentially handled and collectively elaborated, having no other purpose than the objectives of this study. The participants were not rewarded and would be given access to the study data upon request when deemed reasonable. The study design assured adequate protection of the participants as the individual participant could not be identified through the questionnaire.

Results

Sociodemographic characteristics

The demographic information obtained from the 191 participants included gender, race, age, Body Mass Index (BMI), education, etc. (Table 2) Overall, the warded adult patients were majority females (52.4%), Malays (57.1%), married (70.2%), and with secondary or below education (77.5%). Most were out of the labour force (55.0%). The respondents' average monthly income was below RM1000 in 56.0%. The mean age of the respondents was 47.53 years, and this explained why the age group from 45-64 years old had the highest percentage among all age groups. The average number for the number of children among the adult patients was at least 3 children (36.1%). In general, minorities of the participants performed regular exercise (45.0%), smoked (25.1%), consumed alcohol (16.8%), or had MH awareness (45.5%). Higher proportions of participants were overweight with BMI 23-28 kg/m^2 (34.6%), had only 1 comorbidity (30.4%), or were on at least 3 long-term medications (46.6%).

Prevalence of psychological distress and distribution among study participants

Significant prevalences of symptoms of depression, anxiety, and stress were identified from the study population using the DASS-21 questionnaires. The highest prevalent symptom among the participants was anxiety (34.0%), followed by stress (16.8%) and depression (15.2%) (Table 3). By comparing the severity of the symptoms, higher percentages were found among those who were classified as mild condition in anxiety, stress and depression with 15.2%, 9.4% and 7.3%, respectively. Out of 191 participants, 8.4% presented symptoms of two mental disorders, and 11.0% of them experienced symptoms of anxiety, depression and stress simultaneously (Table 4).

Table 2 Demographic characteristics of participants

Characteristics	Patients (n=191)	
	Number	%
Gender		
Male	91	47.6
Female	100	52.4
Race		
Chinese	27	14.1
Indian	33	17.3
Orang Asli	22	11.5
Malay	109	57.1
Age (years old)		
Mean (S.D.) = 47.53 (16.805)		
≤24	23	12.0
25–44	52	27.2
45–64	81	42.4
≥65	35	18.3
BMI		
Underweight (<18.5)	22	11.5
Normal weight (18.5–22.9)	60	31.4
Overweight (23–28)	66	34.6
Obese (>28)	43	22.5
Education		
Secondary education or below	148	77.5
Tertiary education	43	22.5
Performed regular exercise		
Yes	86	45.0
Employment		
Working	69	36.1
Unemployed	17	8.9
Out of labour force (student/housewife/retired)	105	55.0
Marital status		
Married	134	70.2
Single (unmarried/separated/widowed)	57	29.8
Number of children		
Mean (S.D.) = 2.0 (1.8)		
0	56	29.3
1	28	14.7
2	38	19.9
≥3	69	36.1
Income		
<RM1000 or none	107	56.0
RM1000–RM3000	66	34.6
>RM3000	18	9.4
Smoking		
Yes	48	25.1
Alcohol		
Yes	32	16.8
Comorbidity		
No	57	29.8
1 disease	58	30.4
2 diseases	56	29.3
≥3 diseases	20	10.4
Number of long-term medications		
No	61	31.9
1	18	9.4
2	23	12
≥3	89	46.6
Awareness about mental health		
Yes	87	45.5
≥65 years old	35	18.3

S.D.=standard deviation, BMI=body mass index

Table 3 Prevalence of psychological distress and distribution of participants based on the categorisation of their Depression, Anxiety and Stress Scale-21 subscale scores

		Normal	Mild	Moderate	Severe	Very severe
Depression	Number	162	14	9	5	1
	%	84.8	7.3	4.7	2.6	0.5
Anxiety	Number	126	29	15	13	8
	%	66.0	15.2	7.9	6.8	4.2
Stress	Number	159	18	8	5	1
	%	83.2	9.4	4.2	2.6	0.5

Table 4 Prevalence of psychological distress and distribution of participants based on the combination of their Depression, Anxiety and Stress Scale-21 categories

		1 Type*	2 Types#	3 Types+	None
Patients (n=191)	Number	31	16	21	123
	%	16.2	8.4	11.0	64.4

*Stress or Anxiety or Depression only
#Stress+ Anxiety or Anxiety + Depression or Depression + Stress
+Stress + Depression + Anxiety

Association of sociodemographic factors with Psychological Distress

Table 5 illustrates the sociodemographic factors associated with depression using bivariate and multivariate regression analyses. Both analyses showed that race (p-value=0.012), Orang Asli (p-value=0.037), and participants without awareness about MH (p-value=0.005) were significantly associated with depression. The odds of depression of Orang Asli was 3.076 times higher than the other races. Meanwhile, those without awareness exhibited 3.790 higher odds of depression when controlling for race. Table 6 shows the relationship between sociodemographic factors and anxiety. Significant factors unveiled from the bivariate logistics regression analysis included Orang Asli, individuals who performed regular exercise, and non-alcohol consumers. However, different variables were found to be significantly associated with anxiety following the multivariate logistics regression analysis. These factors included respondents who performed regular exercise, who were employed, non-smokers, non-alcohol consumers, and without MH awareness with p-values of 0.041, 0.033, 0.029, 0.047 and 0.035, respectively. Higher odds of anxiety symptoms were detected in those who exercised regularly, who were out of labour force, non-smokers, alcohol consumers, and without awareness about mental health. Some variables which were insignificant in bivariate analysis became significant in multivariate analysis, possibly due to imbalance in sample size, missing data, an extremely large group variation relative to between group variation, and the existence of interaction between the variables.[10]

Table 7 demonstrates the factors associated with stress. Income (p-value=0.028) was the only factor that was found to be significantly associated with stress in both analyses. Higher odds were observed in participants who had monthly income less than RM1,000.

In short, the factors associated with depression were race and MH awareness. Regular exercise, employment, smoked, alcohol consumption and MH awareness were factors associated with anxiety. Stress was closely aligned to income.

Discussion

Approximately 450 million people suffer from MH disorder globally. The extent of the burden of MH disorders is hard to assess and quantify.[1] Anxiety is the most common MH disorder, while depression is the major contributor to disability, as reported by WHO.[11] The report from WHO showed that the proportions of the global population with depression and anxiety in 2015 were estimated to be 4.4% and 3.6% respectively.[11] However, a higher prevalence was detected in anxiety (4.9%) compared to depression (3.8%) among Malaysians.[11] The prevalence of MH disorders was anticipated to rise dramatically as the COVID-19 outbreak swept swiftly across the world. According to the findings of this study which was conducted prior to the beginning of the COVID-19 pandemic, the occurrences of the main PDs among the warded adult patients in Hospital Tapah were anxiety (34.0%), stress (16.8%), and depression (15.2%). The participants were found to have mild symptoms of anxiety, stress, and depression. Our figures can be compared to a recent study done during the COVID-19 epidemic, which found that Malaysians had mean scores

Table 5 Factors associated with depression using bivariate and multivariate regression analysis

Variable	Normal Number (%)	Depression Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Gender										
Male	74 (38.7)	17 (8.9)	1.685	0.756; 3.753	1.629 (1)	0.202				
Female	88 (56.9)	12 (6.3)	0.136							
Race					9.654 (3)	0.022			10.878 (3)	0.012
Chinese	25 (13.1)	2 (1.0)	0.433	0.094; 2.000	1.149 (1)	0.284	0.366	0.077; 1.728	1.612 (1)	0.204
Indian	31 (16.2)	2 (1.0)	0.349	0.076; 1.597	1.839 (1)	0.175	0.256	0.055; 1.198	2.996 (1)	0.083
Orang Asli	14 (7.3)	8 (4.2)	3.092	1.125; 8.500	4.789 (1)	0.029	3.076	1.071; 8.838	4.356 (1)	0.037
Malay	92 (48.2)	17 (8.9)	0.185							
Age (years old)					3.156 (3)	0.368				
≤24	17 (8.9)	6 (3.1)	3.765	0.835; 16.966	2.978 (1)	0.084				
25–44	44 (23.0)	8 (4.2)	1.939	0.477; 7.887	0.856 (1)	0.355				
45–64	69 (36.1)	12 (6.3)	1.855	0.489; 7.034	0.826 (1)	0.364				
≥65	32 (16.8)	3 (1.6)	0.094							
BMI					2.082 (3)	0.556				
Underweight (<18.5)	20 (10.5)	2 (1.0)	0.760	0.135; 4.274	0.097 (1)	0.755				
Normal weight (18.5–22.9)	48 (25.1)	12 (6.3)	1.900	0.616; 5.863	1.247 (1)	0.264				
Overweight (23–28)	56 (29.3)	10 (5.2)	1.357	0.430; 4.285	0.271 (1)	0.603				
Obese (>28)	38 (19.9)	5 (2.6)	0.132							
Education										
Secondary education or below	126 (66.0)	22 (11.5)	0.898	0.355; 2.271	0.052 (1)	0.820				
Tertiary education	36 (18.8)	7 (3.7)	0.194							
Performed regular exercise										
Yes	72 (37.7)	14 (7.3)	1.167	0.529; 2.575	0.146 (1)	0.703				
No	90 (47.1)	15 (7.9)	0.167							
Employment					1.942 (2)	0.379				
Working	60 (31.4)	9 (4.7)	0.679	0.288; 1.603	0.377 (1)	0.377				
Unemployed	16 (8.4)	1 (0.5)	0.283	0.035; 2.266	0.234 (1)	0.234				
Out of labour force (student/housewife/ retired)	86 (45.0)	19 (9.9)	0.221							
Marital status										
Married	112 (58.6)	22 (11.5)	1.403	0.563; 3.498	0.528 (1)	0.467				
Single (unmarried/ separated/widowed)	50 (26.2)	7 (3.7)	0.140							

Table 5 (Continued)

Variable	Normal Number (%)	Depression Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Number of children					1.282 (3)	0.733				
0	46 (24.1)	10 (5.2)	1.449	0.544; 3.858	0.552 (1)	0.458				
1	25 (13.1)	3 (1.6)	0.800	0.200; 3.204	0.099 (1)	0.753				
2	31 (16.2)	7 (3.7)	1.505	0.512; 4.427	0.552 (1)	0.457				
≥3	60 (31.4)	9 (4.7)	0.150							
Income					2.803 (2)	0.246				
<RM1,000 or none	85 (44.5)	22 (11.5)	4.181E8	0.000	0.000 (1)	0.998				
RM1,000–RM3,000	59 (30.9)	7 (3.7)	1.917E8	0.000	0.000 (1)	0.998				
>RM3,000	18 (9.4)	0 (0.0)	1.000							
Smoking										
No	121 (63.4)	22 (11.5)	1.065	0.424; 2.676	0.018 (1)	0.894				
Yes	41 (21.5)	7 (3.7)	0.171							
Alcohol										
No	135 (70.7)	24 (12.6)	0.960	0.336; 2.739	0.006 (1)	0.939				
Yes	27 (14.1)	5 (2.6)	0.185							
Comorbidity					1.627 (3)	0.653				
No	48 (25.1)	9 (4.7)	3.562	0.422; 30.074	1.363 (1)	0.243				
1 disease	48 (25.1)	10 (5.2)	3.958	0.474; 33.082	1.613 (1)	0.204				
2 disease	47 (24.6)	9 (4.7)	3.638	0.431; 30.726	1.408 (1)	0.235				
≥3 disease	19 (9.9)	1 (0.5)	0.053							
Number of long-term medications					1.395 (3)	0.707				
No	51 (26.7)	10 (5.2)	1.390	0.551; 3.511	0.486 (1)	0.486				
1	15 (7.9)	3 (1.6)	1.418	0.353; 5.700	0.242 (1)	0.623				
2	18 (9.4)	5 (2.6)	1.970	0.608; 6.377	1.279 (1)	0.258				
≥3	78 (40.8)	11 (5.8)	0.141							
Awareness about mental health										
No	82 (42.9)	22 (11.5)	3.066	1.241; 7.576	5.894 (1)	0.015	3.790	1.480; 9.703	7.713 (1)	0.005
Yes	80 (41.9)	7 (3.7)	0.088							

OR=odds ratio, 95% CI OR=odds ratio with 95% confidence interval, X_2 stat.=chi-square statistic, df=degrees of freedom, a=likelihood ratio (LR) test

Table 6 Factors associated with anxiety using bivariate regression analysis

Variable	Normal Number (%)	Anxiety Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Gender										
Male	55 (28.8)	36 (18.8)	0.956	0.736; 1.242	0.111 (1)	0.739				
Female	71 (37.2)	29 (15.2)	0.592							
Race					5.050 (3)	0.168				
Chinese	17 (8.9)	10 (5.2)	1.298	0.538; 3.128	0.337 (1)	0.562				
Indian	24 (12.6)	9 (4.7)	0.827	0.348; 1.968	0.184 (1)	0.668				
Orang Asli	10 (5.2)	12 (6.3)	2.647	1.042; 6.722	4.191 (1)	0.041				
Malay	75 (39.3)	34 (17.8)	0.453							
Age (years old)					1.722 (3)	0.632				
≤24	13 (6.8)	10 (5.2)	1.923	0.638; 5.797	1.349 (1)	0.245				
25–44	36 (18.8)	16 (8.4)	1.111	0.434; 2.846	0.048 (1)	0.826				
45–64	52 (27.2)	29 (15.2)	1.394	0.588; 3.303	0.570 (1)	0.450				
≥65	25 (13.1)	10 (5.2)	0.400							
BMI					2.096 (3)	0.553				
Underweight (<18.5)	12 (6.3)	10 (5.2)	1.556	0.546; 4.435	0.683 (1)	0.408				
Normal weight (18.5–22.9)	39 (20.4)	21 (11.0)	1.005	0.442; 2.285	0.000 (1)	0.990				
Overweight (23–28)	47 (24.6)	19 (9.9)	0.755	0.331; 1.718	0.450 (1)	0.502				
Obese (>28)	28 (14.7)	15 (7.9)	0.536							
Education										
Secondary education or below	97 (50.8)	51 (26.7)	1.089	0.529; 2.243	0.054 (1)	0.817				
Tertiary education	29 (15.2)	14 (7.3)	0.483							
Performed regular exercise										
Yes	50 (26.2)	36 (18.8)	1.887	1.030; 3.457	4.225 (1)	0.040	1.993	1.029; 3.861	4.181 (1)	0.041
No	76 (39.8)	29 (15.2)	0.382							
Employment				3.724 (2)	0.155			4.880 (2)	0.087	
Working	51 (26.7)	18 (9.4)	0.529	0.272; 1.029	3.522 (1)	0.061	0.457	0.223; 0.939	4.544 (1)	0.033
Unemployed	12 (6.3)	5 (2.6)	0.625	0.205; 1.904	0.684 (1)	0.408	0.533	0.156; 1.820	1.007 (1)	0.316
Out of labour force (student/housewife/ retired)	63 (33.0)	42 (22.0)	0.667							
Marital status										
Married	89 (46.6)	45 (23.6)	0.935	0.488; 1.794	0.040 (1)	0.841				
Single (unmarried/ separated/widowed)	37 (19.4)	20 (10.5)	0.541							

Table 6 (Continued)

Variable	Normal Number (%)	Anxiety Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Number of children					0.521 (3)	0.914				
0	37 (19.4)	19 (9.9)	0.963	0.458; 2.023	0.010 (1)	0.920				
1	20 (10.5)	8 (4.2)	0.750	0.288; 1.955	0.346 (1)	0.556				
2	24 (12.6)	14 (7.3)	1.094	0.480; 2.495	0.045 (1)	0.831				
≥3	45 (23.6)	24 (12.6)	0.533							
Income					4.199 (2)	0.123				
<RM1,000 or none	64 (33.5)	43 (22.5)	2.352	0.725; 7.626	2.029 (1)	0.154				
RM1,000–RM3,000	48 (25.1)	18 (9.4)	1.312	0.381; 4.518	0.186 (1)	0.666				
>RM3,000	14 (7.3)	4 (2.1)	0.286							
Smoking										
No	90 (47.1)	53 (27.7)	1.767	0.846; 3.689	2.295 (1)	0.130	2.631	1.104; 6.269	4.765 (1)	0.029
Yes	36 (18.8)	12 (6.3)	0.333							
Alcohol										
No	110 (57.6)	49 (25.7)	0.445	0.206; 0.962	4.233 (1)	0.040	0.338	0.116; 0.986	4.972 (1)	0.047
Yes	16 (8.4)	16 (8.4)	1.000							
Comorbidity					3.059 (3)	0.383				
No	41 (21.5)	16 (8.4)	1.171	0.365; 3.755	0.070 (1)	0.791				
1 disease	34 (17.8)	24 (12.6)	2.118	0.678; 6.615	1.667 (1)	0.197				
2 disease	36 (18.8)	20 (10.5)	1.667	0.528; 5.265	0.758 (1)	0.384				
≥3 disease	15 (7.9)	5 (2.6)	0.333							
Number of long-term medications					3.263 (3)	0.353				
No	44 (23.0)	17 (8.9)	0.760	0.373; 1.548	0.572 (1)	0.449				
1	9 (4.7)	9 (4.7)	1.967	0.707; 5.471	1.679 (1)	0.195				
2	14 (7.3)	9 (4.7)	1.264	0.491; 3.255	0.236 (1)	0.627				
≥3	59 (30.9)	30 (15.7)	0.508							
Awareness about mental health										
No	63 (33.0)	41 (21.5)	1.708	0.925; 3.153	2.932 (1)	0.087	2.206	1.100; 4.423	4.972 (1)	0.035
Yes	63 (33.0)	24 (12.6)	0.381							

OR=odds ratio, 95% CI OR=odds ratio with 95% confidence interval, X_2 stat.=chi-square statistic, df=degrees of freedom, a=likelihood ratio (LR) test

Table 7 Factors associated with stress using bivariate and multivariate regression analysis

Variable	Normal Number (%)	Stress Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Gender										
Male	71 (37.2)	20 (10.5)	2.066	0.946; 4.511	3.315 (1)	0.069				
Female	88 (46.1)	12 (6.3)	0.136							
Race					3.047 (3)	0.384				
Chinese	22 (11.5)	5 (2.6)	1.149	0.384; 3.434	0.062 (1)	0.804				
Indian	30 (15.7)	3 (1.6)	0.506	0.139; 1.837	1.074 (1)	0.300				
Orang Asli	16 (8.4)	6 (3.1)	1.896	0.653; 5.504	1.384 (1)	0.239				
Malay	91 (47.6)	18 (9.4)	0.198							
Age (years old)					2.396 (3)	0.494				
≤24	17 (8.9)	6 (3.1)	1.706	0.474; 6.137	0.669 (1)	0.414				
25–44	46 (24.1)	6 (3.1)	0.630	0.186; 2.142	0.546 (1)	0.460				
45–64	67 (35.1)	14 (7.3)	1.010	0.353; 2.889	0.000 (1)	0.985				
≥65	29 (15.2)	6 (3.1)	0.207							
BMI					2.771 (3)	0.428				
Underweight (<18.5)	20 (10.5)	2 (1.0)	4.846E8	0.135; 4.274	0.097 (1)	0.755				
Normal weight (18.5–22.9)	47 (24.6)	13 (6.8)	1.723E8	0.688; 6.420	1.701 (1)	0.192				
Overweight (23–28)	54 (28.3)	12 (6.3)	9.693E8	0.550; 5.191	0.837 (1)	0.360				
Obese (>28)	38 (19.9)	5 (2.6)	0.000							
Education										
Secondary education or below	125 (65.4)	23 (12.0)	0.695	0.294; 1.641	0.689 (1)	0.407				
Tertiary education	34 (17.8)	9 (4.7)	0.265							
Performed regular exercise										
Yes	69 (36.1)	17 (8.9)	1.478	0.690; 3.167	1.011 (1)	0.315				
No	90 (47.1)	15 (7.9)	0.167							
Employment					4.434 (2)	0.109				
Working	61 (31.9)	8 (4.2)	0.468	0.196; 1.116	2.933 (1)	0.087				
Unemployed	16 (8.4)	1 (0.5)	0.223	0.028; 1.770	2.016 (1)	0.156				
Out of labour force (student/housewife/ retired)	82 (42.9)	23 (12.0)	0.280							
Marital status										
Married	113 (59.2)	21 (11.0)	0.777	0.347; 1.740	0.376 (1)	0.540				
Single (unmarried/ separated/widowed)	46 (24.1)	11 (5.8)	0.239							

Table 7 (Continued)

Variable	Normal Number (%)	Stress Number (%)	Bivariate				Multivariate			
			Crude OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]	Adjusted OR	95% CI OR	X_2 stat. (df)[a]	p-value[a]
Number of children					3.267 (3)	0.352				
0	44 (23.0)	12 (6.3)	1.609	0.638; 4.060	1.015 (1)	0.314				
1	26 (13.6)	2 (1.0)	0.454	0.093; 2.218	0.952 (1)	0.329				
2	30 (15.7)	8 (4.2)	1.573	0.563; 4.400	0.746 (1)	0.388				
≥3	59 (30.9)	10 (5.2)	0.169							
Income					7.054 (2)	0.029		7.133 (2)	0.028	
<RM1,000 or none	82 (42.9)	25 (13.1)	5.183	0.657; 40.906	2.437 (1)	0.119	5.400	0.645; 45.208	2.420 (1)	0.120
RM1,000-RM3,000	60 (31.4)	6 (3.1)	1.700	0.191; 15.105	0.227 (1)	0.634	1.626	0.176; 15.032	0.184 (1)	0.668
>RM3,000	17 (8.9)	1 (0.5)	0.059							
Smoking										
No	119 (62.3)	24 (12.6)	1.008	0.420; 2.423	0.000 (1)	0.985				
Yes	40 (20.9)	8 (4.2)	0.200							
Alcohol										
No	134 (70.2)	25 (13.1)	0.666	0.260; 1.707	0.716 (1)	0.398				
Yes	25 (13.1)	7 (3.7)	0.280							
Comorbidity					2.998 (3)	0.392				
No	49 (25.7)	8 (4.2)	3.102	0.363; 26.505	1.070 (1)	0.301				
1 disease	47 (24.6)	11 (5.8)	4.447	0.536; 36.874	1.912 (1)	0.167				
2 disease	44 (23.0)	12 (6.3)	5.182	0.628; 42.730	2.336 (1)	0.126				
≥3 disease	19 (9.9)	1 (0.5)	0.053							
Number of long-term medications					2.235 (3)	0.525				
No	52 (27.2)	9 (4.7)	1.012	0.403; 2.539	0.001 (1)	0.980				
1	14 (7.3)	4 (2.1)	1.670	0.475; 5.873	0.640 (1)	0.424				
2	17 (8.9)	6 (3.1)	2.063	0.686; 6.205	1.663 (1)	0.197				
≥3	76 (39.8)	13 (6.8)	0.171							
Awareness about mental health										
No	82 (42.9)	22 (11.5)	2.066	0.919; 4.642	2.066 (1)	0.079				
Yes	77 (40.3)	10 (5.2)	0.130							

OR=odds ratio, 95% CI OR=odds ratio with 95% confidence interval, X_2 stat.=chi-square statistic, df=degrees of freedom, a=likelihood ratio (LR) test

of 9.54, 8.83, and 7.81 in stress, depression, and anxiety, respectively. The pandemic was believed to have a negative effect on the mental health status of Malaysians as more people displayed moderate psychological symptoms during the COVID-19 era, corresponding to the DASS-21 scores of Table 1.[12]

Many studies have been conducted using DASS-21 targeting different populations globally. This study's findings were consistent with several studies which targeted chronic disease models where the prevalence of anxiety was highest.[7,8] Conversely, it was observed that the participants from different countries had the highest scores in stress during the COVID-19 pandemic.[13-15] The difference in outcomes could probably be due to attributes such as differences in culture, working environments, healthcare systems, and attitudes when facing uncertainty, especially during the pandemic.

This research was conducted using modifiable and non-modifiable risk factors. Race was found to be significant during the final model of multivariate analysis, and significantly higher odds of depression were shown among Orang Asli. The NHMS in 2015 reported that other Bumiputera had the highest rate of MH problems, although they are not the largest ethnic group in Malaysia.[2] A study by Taylor et al. highlighted that psychological problems were increasingly highly detected in minor ethnic groups, for instance, African Americans.[16] This could result from socioeconomic constraints, discrimination and poor education.[17] Although there was no significant association between gender and PD in the current study, a meta-analysis found that more women than men had depressive symptoms.[18] Lim et al. suggested that higher female proportion contributed to the heterogeneity in the aggregate prevalence of depression.[18]

MH awareness had a significant correlation with depression and anxiety in the current study. According to the WHO, prevention programmes could improve public awareness and reduce depression rates drastically.[1] According to Mental Atlas 2017, 123 countries had at least two functioning mental health promotion and prevention programmes.[19] Livingston et al. found that young adults who were involved in anti-stigma media campaigns more likely to seek information regarding MH problems.[20] A literature review was done by Dumesnil and Verger, which found that public awareness campaigns were able to improve public knowledge and attitudes about depression.[21] It was found that 3 out of the 15 campaigns had reported a significant increase in the public intention for seeking professional care regarding depression.[21]

Surprisingly, the current study found a significant linkage between individuals who exercised regularly and more anxiety symptoms. Physical activity has usually been associated with positive health benefits, but conflicting results were observed in one study during research into the effect of exercise on MH.[22] Most studies have reported a reduction of anxiety symptoms in participants who engaged in physical activity, which was thought to likely involve biological and psychological factors.[17,23] Another study found that the effect of exercise on MH could vary in different people, which could lead to these conflicting findings. [24] Other studies have suggested that the most evidence-based treatment for PD is cognitive behaviour therapy (CBT), especially Internet CBT that can prevent the spread of infection during the pandemic.[25,26]

Anxiety symptoms were less likely to be reported in working adults. This finding was consistent with another study which reported that unemployed diabetics had higher odds of anxiety compared to those who were gainfully employed. [17] Other studies have suggested that unemployed persons had feelings of instability and financial constraint, which could contribute to PD.[17,27]

A significant association between smoking and anxiety was found in our study, as non-smokers had a higher risk of feeling anxiety. Morissette et al. reported a

possible correlation between smoking and the expectation of reduction in anxiety symptoms. Another study supported the theory that nicotine may cause an anxiolytic effect depending on the timing, smoking context, and the administration route.[28] However, this study's findings were inconsistent with other studies in which smokers had more anxiety symptoms.[27,29] According to the Mental Health Foundation, nicotine brings an immediate relaxation and allows smokers to have a misconception about nicotine. However, this short-term feeling might lead the smokers to withdrawal symptoms and increased cravings.[30]

Pertaining to alcohol consumption, non-alcohol drinkers were less prone to anxiety. The findings of this study were similar to other studies showing an association between alcohol drinkers and anxiety symptoms.[31,32] One study reported that alcohol was able to alter the levels of neurotransmitter.[33] According to the Substance Abuse and Mental Health Services Administration, persistent and binge drinking leads to brain rewiring, and these individuals are more susceptible to anxiety.[34] Individuals could return to their anxious state once the effects of the alcohol wear off. Kushner et al. proposed that short-term anxiety reductions from alcohol started a vicious feed-forward cycle of increasing the comorbidity of anxiety symptom and alcohol use.[33]

Income was found to be significantly associated with stress, and patients with a monthly income of less than RM1000 had the highest odds of stress. Other studies have found financial constraint to be significantly correlates with PD.[35,36] Sareen et al. found associations between low household income and lifetime mental disorders and suicidal attempts, and higher risk for incident mental disorders.[37] Another study reported that cancer patients with low household income were at a higher risk of experiencing distress as they were unable to afford their medical bills.[38] The mechanisms of development of MH disorders may include overcrowding, hunger, violence, social networks, and limited health-care access.[37]

While the study's findings furnish insight on the potential effects for mental health led by PD, it had several limitations. This study was conducted in a single facility and as such, the results could not be generalised to the prevalence of PD in the total population in Malaysia. Also, this was a cross-sectional study, and the causality of the results could not be explained, and other studies would be needed to examine this aspect of this problem. The size of the study sample is a crucial consideration for research. A decreasing number of patients during the data collection period caused by uncontrollable situations lowered the study's statistical power. The setback of considering a sample size of 191 instead of the required 304 in the study was compensated for by the post-hoc power analysis, which produced an excellent statistical power of over 80.0%, fulfilling the standard threshold of 80.0%. This study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make a clinical diagnosis. The gold standard for establishing psychiatric diagnosis involves a structured clinical interview and functional neuroimaging. Future studies are required which correlate DASS-21 with neuroimaging results.[39,40]

Conclusion

PD has been increasing in recent years worldwide, and the problem has been exacerbated by the negative adverse impacts caused by the COVID-19 pandemic. Untreated psychological disorders lead to severe health problems. Thus, having a good grasp of the key determinants of the probable development of PD in patients is essential. The results of this study revealed that anxiety had the highest prevalence among warded adult patients in Hospital Tapah. Race and MH awareness were the significant risk factors for depression. Factors associated with anxiety included regular exercise, employment, smoking, alcohol consumption, and MH awareness. Income was found to be significantly associated with stress. Despite a sample size constraint, the study's findings were confirmed following

post-hoc analysis. Further studies should be conducted for better understanding to help propose intervention measures to help remedy this condition. Future research should consider to correlate DASS-21 with neuroimaging results since the criteria for making a psychiatric diagnosis involve a structured clinical interview and functional neuroimaging.

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Conflict of interest

All authors have declared no conflicts of interest.

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