

Title: Prevalence and Predictors of Anxiety Among Stable Hospitalized COVID-19 Patients in Malaysia

Authors: Muhammad Azri Adam bin Adnan¹, Mohd Shaiful Azlan Bin Kassim¹, Norhafizah Bt Sahril¹, Mohamad Aznuddin Bin Abd Razak¹

Affiliation:

1. Blok B5 & B6, Kompleks Institut Kesihatan Negara (NIH) , No.1, Jalan Setia Murni U13/52, Seksyen U13 Setia Alam, 40170 Shah Alam, Selangor

Abstract

The COVID-19 pandemic creates anxiety among hospitalised SARS-CoV-2 patients. Therefore, this study aims to determine the prevalence of anxiety and its associated factors among stable inpatient COVID-19 patients in Malaysia. A cross-sectional study was conducted using a web-based online survey involving 401 patients from Malaysia's leading COVID-19 hospitals from 15th April until 30th June 2020 who were chosen using quota sampling. General Anxiety Disorders 7 items (GAD-7), Coping Orientation to Problems Experienced Inventory (Brief-COPE) and Socio-demographic profile questionnaire were used. Descriptive analysis and multiple logistic regression were performed using SPSS v23 to determine the prevalence of anxiety and its associated factors. The results showed that prevalence of anxiety was 7.0%. Multiple logistic regression analysis revealed that female ($p < 0.05$), fear of infection ($p < 0.05$), lack of information ($p < 0.05$), maladaptive coping mechanism of behavioural disengagement ($p < 0.001$) and self-blame ($p < 0.001$) were significantly associated with anxiety. Whereas adaptive coping mechanisms via instrumental support ($p < 0.001$) was a significant protective predictor of anxiety. COVID-19 infection has had a significant influence on the mental health of patients. Findings in our study provides baseline findings on prevalence of anxiety among stabilized COVID-19 inpatient in Malaysia. Despite the relative low prevalence, the data has

the potential to improve the present mental health monitoring system and the deployment of suitable treatments in dealing with similar circumstances.

(227 words)

Keywords (COVID-19, Anxiety, Mental Health, Hospitalized, Malaysia)

INTRODUCTION

An outbreak driven by a novel coronavirus has become the focus of scientific attention in recent months. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a strain of coronavirus that cause the transmission of the coronavirus disease-19 (COVID-19). In March 2020, the World Health Organization (WHO) proclaimed the outbreak a pandemic and declared the world to be in the midst of a worldwide health calamity [1] as the disease is strongly linked with very serious health issues and can be deadly [2]. Since November 2019, this pandemic, which began in Wuhan, China, has spread to 216 nations and to date, more than 25 million people had contracted the disease and caused more than 5 million deaths worldwide [3]. On January 24, 2020, Malaysia announced the first case of COVID-19. Since then, there have been over 2 million positive cases discovered [4].

The pandemic has been linked to multiple social disturbances as well as severe economic effects. These factors, together with the possibility of stigma and prejudice, can contribute to mental health issues for patients contracted with COVID-19 as well as the public [5]–[7]. The World Health Organization (WHO) had recommended that mental health issues should be taken seriously and monitored during the extended COVID-19 response as one of its essential health services [8]. Mental well-being assessments conducted in China following

COVID-19 as early as March 2020 reported a significant increase in negative emotions such as despair, anxiety, and dread of death in both the afflicted and unaffected populations. The population as a whole was assessed to have a decreased level of enjoyment and a strong sense of insecurity. This anxiety was more severe among COVID-19 patients, resulting in self-isolation, feelings of despair, and dread of infecting others, even after they had been treated and had completed the quarantine period. [9]. During the third wave of COVID-19 pandemic which began on 20th September 2020, a cross-sectional online survey was conducted involving 1,544 participants using social media platforms to study the prevalence and determinants of depression and anxiety in the Malaysian population. The results showed that 43.6% of the participants had symptoms of anxiety with 34.1% of them in the mild to moderate anxiety category. In terms of depression, it was discovered that nearly three-quarters of the participants were depressed, with 70% of the responder suffering from moderate to severe depression [10].

COVID-19 -related mental health issues in the general population, health care workers, and those with a diagnosed mental disorder were the topics of previous research investigations. The study on the mental health impacts of COVID-19 on infected patients is still limited, owing to the fact that in infection units, the patient's physical well-being has traditionally taken precedence over their psychological assessment. Patients with COVID-19 may be under more psychological stress than the general population because of their treatment in isolation wards and they may experience boredom and loneliness during the quarantine period. Additionally, the circumstances they encounter while in the hospital can be traumatising [11]. Nervousness and anxiety are also frequently seen in isolation and quarantine wards [12]. In a recent comprehensive study on the psychological effects of quarantine by Brooks et al. 2020, it was observed that unfavourable psychological consequences such as post-traumatic stress symptoms, bewilderment, and rage. Longer isolation, infection worries, frustration and boredom were but a few of the stressors that impacted the patients [12]. As was proven during

outbreak of influenza A (H1N1), Ebola virus disease (EVD), severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks, hospitalized patients experienced significant psychological distress both during the acute illness and on long term phase of the disease after an epidemic [13]–[16].

In a study conducted by A. Zandifar et al in Iran discovered a high prevalence of psychiatric disorders among hospitalized COVID-19 patients. It was reported that 100% of the patients participated in the study experienced anxiety. Further it was highlighted that 97.2% of the COVID-19 patients had some level of depression while 97.1% of them had some degree of stress [17]. Additionally, in one of the early studies on the mental health effects of COVID-19, researchers at a hospital in Wuhan, China, found that the prevalence of anxiety and depression symptoms among hospitalized patients with COVID-19 was 18.6 % and 13.4, respectively [18].

COVID-19 hospitalized patients' mental health is a major issue. This is a global problem deserving of worldwide attention. Hence, the purpose of this study is to determine the prevalence of anxiety among the inpatient COVID-19 patients through their demographic characteristics, which would raise further understanding and awareness of the importance of addressing mental health in this group. The American Psychological Association (APA) defines anxiety as "an emotion characterized by feelings of tension, worried thoughts, and physical changes" [19]. Anxiety, which is known to be a strong predictor for suicide ideation and attempts [20], together with its associated risk factors among hospitalized COVID-19 patients, must be assessed in order to provide early psychiatric intervention during the hospitalisation period. Therefore, this study also plans to develop a predictive model for anxiety among hospitalized COVID-19 patients and their associated predictors.

METHODS AND MATERIALS

Study design

This was a cross-sectional study conducted in selected COVID-19 hospitals in Malaysia from 15th April 2020 until 30th June 2020. The selected hospitals were Hospital Kuala Lumpur (HKL), Hospital Permai Johor Bahru (HPJB), Hospital Sungai Buloh (HSB), and Malaysia Agro Exposition Park Serdang low-risk patient quarantine and treatment centre (MAEPS). The target population consisted of all COVID-19 patients admitted to the hospitals. The sampling frame comprised all individuals diagnosed with COVID-19 infection admitted to general ward and were in stable condition. The quota sampling technique was used in this study, with the first 400 eligible patients responding to the screening being recruited. Screening of eligible responses commenced on the 15th of April 2020. A respondent must be at least 18 years old, have been diagnosed with COVID-19, be in stable health (non-intensive care unit), and have been admitted more than 24 hours in a general ward or quarantine centre. Additionally, they must be fluent in Malay or English and be able to converse in both languages. Participation in this study was entirely optional, with respondents able to refuse or withdraw at any time throughout the survey. If a respondent rejects, their whole profile, including any responses, will be removed.

Sample size and study procedure

A total of 401 COVID-19 patients participated in this study. Data collection was conducted using online platform through Google Form Link to prevent the transmission of COVID-19. The respondents were contacted by research assistants, who provided them with information about the study and afterwards acquired their agreement via the Google form questionnaire in the first section. Approximately 15 to 20 minutes were required to complete the self-administered online questionnaire, which was available in both English and Malay. A pilot study with at least 30 different responses was done to validate the system, and changes have

been made based on the feedback from the people who took the survey. The completed methods of this study can be found elsewhere. [21]

Ethics approval and privacy

This study was registered under the National Medical Research Registry (NMRR), Ministry of Health Malaysia (NMRR-20-711-54541) and obtained ethical approval from Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia.

The database was protected to protect the privacy and confidentiality of the data. By assigning a unique password to each file, the dataset was protected in any format. Only researchers from the core team were permitted to examine participants' personal information, and the data will be preserved.

Survey instruments/Questionnaire

For the purpose of data collection in this research, a structured questionnaire in Malay and English was built into a Google Form online survey. The survey included a sociodemographic part as well as specific study instruments. The Google Form is divided into four sections, the first of which was the Patient Information Sheet and Consent page. The second section of the Google Form included information on the respondents' sociodemographic characteristics and stressors associated with mental health. Age group, gender, marital status, education level, occupation, ethnicity and family income were all included in the sociodemographic data. In terms of stressors, fear of infection, social discrimination, financial burden and lack of information of COVID-19 are stressors that were assessed in this study. The third section included GAD-7 questions used to screen for possible anxiety. The fourth section is the coping strategies using Brief COPE (Coping Orientation to Problems Experienced). The two psychometric instruments (GAD-7 and Brief COPE) in the questionnaires, both in English and Malay, had previously been validated locally [22], [23]

Generalized Anxiety Disorder Scale (GAD-7)

The GAD-7 is a 7-items self-report questionnaire that is often used in primary care and mental health settings to screen for the presence of anxiety. It assesses the presence of anxiety symptoms in the preceding two weeks of everyday living. Each item had four answers: 'not at all', 'several days', 'more than half the days', and 'nearly every day'. Each of the seven items was scored from 0 (not at all) to 3 (nearly every day). Scores of the GAD-7 ranged from 0 to 21. Total scores of 8 and above indicated the existence of anxiety [24]. Spitzer et al [25] invented the original version of the tool. Sherina et al later validated it in the Malay form [23].

Brief-Cope (Coping Orientation to Problems Experienced) Inventory

Brief-COPE is a 28-item self-report questionnaire derived from the original 60-item Cope Inventory. It is used to evaluate coping mechanisms in reaction to stress [26]. In total, 14 dimensions are covered by this scale. These are self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion and self-blame. Every dimension has two items which is rated by the four-point likert scale, ranging from "I haven't been doing this at all" (score 0) to "I have been doing this a lot" (score 3). Each of the 14 subscales represents a distinct pattern of coping, which may be either adaptive or maladaptive subscales. The Adaptive Coping subscale contains 16 items with a possible range of 0 to 48, such that higher scores indicate greater use of adaptive coping. The Adaptive Coping subscale includes Active Coping, Planning, Positive Reframing, Acceptance, Humor, Religion, Using Emotional Support, and Using Instrumental Support. The Maladaptive Coping subscale contains 12 items with a possible range of 0 to 36, such that higher scores indicate greater use of maladaptive coping. The Maladaptive Coping subscale includes Self-Distraction, Denial,

Venting, Substance Use, Behavioural Disengagement, and Self-Blame. In Malaysia, both the English and Malay versions have been validated [27].

Data Analysis

The Statistical Package for Social Science (SPSS) Version 23.0 for Windows was used to analyse the data. Descriptive statistics were used to assess the prevalence of anxiety and demographic characteristics using chi-square test. Multiple logistic regression was used to construct a prediction model for anxiety. All variables with P - value < 0.25 in univariable analysis and variables known to be associated with anxiety from published articles were included in the model to control for possible confounding factors. The backward LR step was used to get the best predictor model for anxiety. A p -value < 0.05 was considered to be significantly associated with anxiety.

RESULTS

Socio-Demographic characteristic

A total of 401 COVID-19 patients from 3 hospitals (Hospital Sungai Buloh, Hospital Permai JB, Hospital Kuala Lumpur) and MAEPS were involved in this study. About 68% of the participants were from Hospital Sungai Buloh, 15% from the MAEPS, 11% from Hospital Permai JB and 6% from Hospital Kuala Lumpur. The demographic information of the COVID-19 patients (respondents) is shown in Table 1. Majority of the respondents were male, and aged 18–34 years. The mean age (SD) of the participants was 32.65 (11.58) years old. In terms of ethnicity, Malays made up the majority of respondents (68.3%), followed by others (18.2%), Chinese (6.7%), Indian (5.0%), and other Bumiputera (1.7%), respectively. About 49.1% of participants were married, while 50.9% were single or widowed. In terms of education, 50.4% had completed tertiary education, 25.4% had completed secondary school, 16.1% had completed elementary school, and 8.2% had no formal education. Most of the respondents

worked in the private sector (34.4%), followed by self-employed (12.5%), public servants (8.5%), and healthcare professionals (8.5%). Others were either unemployed, retired, or students (37.7%), or housewives (2.0%). The majority of the respondents (71.8%) were under the B40 household income group, followed by M40 (17.0%), and T20 (11.2%). In addition, 81.8% of the participants in this survey were Malaysians, while 18.2% were non-Malaysians.

Table 1: Socio-demographic characteristic of respondents (n=401)

Socio-demographic characteristics		Number of respondents (n)	Percentage (%)
Gender	Male	274	68.3
	Female	127	31.7
Age group (years)	18 – 34	258	64.3
	35 – 49	106	26.4
	≥ 50	37	9.2
Ethnicity	Malay	274	68.3
	Chinese	27	6.7
	Indian	20	5.0
	Other Bumiputera	7	1.7
	Others	73	18.2
Citizenship	Malaysian	328	81.8

	Non-Malaysian	7.3	18.2
Marital status	Married	204	49.1
	Single/ widow/er	197	50.9
Education level	No formal education	33	8.2
	Primary education	64	16.0
	Secondary education	102	25.4
	Tertiary education	202	50.4
Occupation	Civil servant	34	8.5
	Private sector employee	138	34.4
	Self-employed	50	12.5
	Healthcare worker	19	4.7
	Not working / Pensioner /	151	37.7
	Student		
	Housewife	9	2.2
Household income	B40	288	71.8
group			
	M40	68	17.0
	T20	45	11.2

Prevalence Of Anxiety by Hospitals

Overall, the prevalence of anxiety among hospitalized COVID-19 patient was 7.0% (n=28) with the mean GAD-7 score was 2.58 (SD, 3.58). The highest anxiety prevalence rate was recorded by Hospital Permai JB, which was 9.1%, followed by Hospital Sungai Buloh (8.1%), MAEPS (3.2%) and Hospital Kuala Lumpur (0%).

Prevalence Of Anxiety by Socio-Demographic Characteristics

Table 2 summarises the prevalence of anxiety and its association with sociodemographic characteristics. Anxiety was significantly more likely in the following group of single/widow/ers ($p < 0.05$) than in married participants. Male respondents were shown to have a greater prevalence of anxiety than female respondents, and respondents from the age group 18–34 had the highest prevalence rate when compared with other age groups. In terms of ethnicity, Chinese people had the highest prevalence rate. Additionally, anxiety was shown to be higher among Malaysian nationals than among non-Malaysian nationals. Anxiety was not significantly prevalent in any specific education level groups or among occupation groups. Furthermore, in this study, there was no significant relationship between anxiety and household income group.

Table 2: Prevalence of anxiety by socio-demographic characteristics

Socio-demographic characteristics		Number of respondents (n)	Prevalence (%)	p-value
Overall		401	7.0	
Gender	Male	274	7.3	.715
	Female	127	6.3	
Age group (years)	18 – 34	258	7.8	.718
	35 – 49	106	5.7	
	≥ 50	37	5.4	
Ethnicity	Malay	274	8.4%	.231
	Chinese	27	11.1%	
	Indian	20	0.0%	

	Other Bumiputera	7	0.0%	
	Others	73	2.7%	
Citizenship	Malaysian	328	7.9%	.465
	Non-Malaysian	7.3	2.7%	
Marital status	Married	197	4.1%	.024*
	Single/ widow/er	204	9.8%	
Education level	No formal education	33	3.0%	.447
	Primary education	64	4.7%	
	Secondary education	102	5.9%	
	Tertiary education	202	8.9%	
Occupation	Civil servant	34	2.9%	.054
	Private sector employee	138	5.1%	
	Self-employed	50	2.0%	
	Healthcare worker	19	0.0%	
	Not working / Pensioner /	151	11.9%	
	Student			
	Housewife	9	11.1%	
Household income	B40	288	5.2%	.069
group				
	M40	68	10.3%	
	T20	45	13.3%	

* A p-value < 0.05 is statistically significant.

Prediction Models for Anxiety

Subsequently, simple and multivariable logistic regression analyses were used to assess the risk factors for anxiety in connection to sociodemographic variables, stressors, and coping methods in COVID-19 patients. Bivariable analysis found that anxiety was associated with those patients who were single/widow, not working/student/pension, and under category B40 Household income. In terms of stressors, fear of infection and lack of information were found to be significant with anxiety. Self-distraction, active coping, denial, substance use, behavioural disengagement, venting, humour and self-blame are coping strategies that are associated with anxiety. Further multivariable analysis using logistic regression revealed that respondents who are single/widower had 2.87 times higher odds of having anxiety than those who are married (aOR = 2.87, 95% CI: 1.01, 8.18). Furthermore, in terms of stressors, fear of infection (OR = 1.82, 95% CI: 1.08, 3.04) and lack of information (aOR = 1.82, 95% CI: 1.08, 3.04) were both found to be a major risk factor associated with anxiety. In addition, instrumental aid as a coping method is significantly correlated with a decrease in anxiety (aOR = 0.65, 95% CI: 0.47, 0.90). However, dysfunctional coping mechanism such as behavioural disengagement (aOR = 2.03, 95% CI: 1.30, 3.18) and self-blame (aOR = 1.74, 95% CI: 1.31, 2.30) were found to be correlated with anxiety in this study. Refer to table 3.

Table 3: Simple and Multiple Logistic Regression of Anxiety among hospitalized patients with COVID-19

Predictors	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Gender				
Male	1		-	-
Female	0.85 (0.37, 1.99)	0.715	-	-
Marital Status				

Single/widow	2.57 (1.10, 5.98)	0.029	2.87 (1.01, 8.18)	< 0.05*
Married	1		1	
Education level				
No formal education	1		-	-
Primary	1.57 (0.16, 15.75)	0.700	-	-
Secondary	2.00 (0.23, 17.25)	0.528	-	-
Tertiary	3.13 (0.40, 24.28)	0.275	-	-
Occupation				
Civil servant	0.57 (0.07, 4.77)	0.602	-	-
Private sector employee	1	0.374	-	-
Self-employment	0.38 (0.05, 3.19)	0.374	-	-
Not working/student/pensioner	2.53 (1.02, 6.27)	0.044	-	-
Housewife	2.34 (0.26, 21.40)	0.452	-	-
Age group (years)				
18-34	1		-	-
35-49	0.71 (0.28, 1.83)	0.483	-	-
≥ 50	0.68 (0.15, 3.04)	0.613	-	-
Household income group				
B40	0.36 (0.13, 0.98)	0.045	-	-
M40	0.75 (0.23, 2.38)	0.621	-	-
T20	1		-	-
Stressors				
Fear of Infection	2.20 (1.42, 3.40)	<0.001	1.82 (1.08, 3.04)	< 0.05*

Social Discrimination	1.31 (0.90, 1.90)	0.154	-	-
Financial Burden	1.31 (0.92, 1.87)	0.138	-	-
Lack of Information	1.51 (1.02, 2.22)	0.039	1.68 (1.01, 2.79)	< 0.05*
Coping strategies				
Self-distraction	1.38 (1.12, 1.69)	0.002	-	-
Active coping	1.28 (1.04, 1.57)	0.018	-	-
Denial	1.35 (1.06, 1.71)	0.015	-	-
Substance use	2.35 (1.37, 4.01)	0.002	-	-
Emotional support	1.15 (0.95, 1.41)	0.161	-	-
Instrumental support	0.99 (0.81, 1.20)	0.877	0.65 (0.47, 0.90)	< 0.001*
Behavioural disengagement	2.35 (1.74, 3.17)	<0.001	2.03 (1.30, 3.18)	< 0.001*
Venting	1.50 (1.21, 1.87)	<0.001	-	-
Positive reframing	1.12 (0.93, 1.37)	0.240	-	-
Planning	1.15 (0.94, 1.41)	0.185	-	-
Humour	1.78 (1.35, 2.34)	<0.001	-	-
Acceptance	1.11 (0.91, 1.36)	0.321	-	-
Religion	1.02 (0.81, 1.28)	0.863	-	-
Self-blame	2.16 (1.72, 2.72)	<0.001	1.75 (1.27, 2.40)	< 0.001*

* Not working/student/pensioner, B40, social discrimination, financial burden, self-distraction, active coping, denial, substance use, emotional support, venting, positive reframing, planning and humour were removed by SPSS using backward logistic regression analysis

* A p-value < 0.05 is statistically significant.

DISCUSSION

In this cross-sectional study, we found that the prevalence of anxiety among hospitalized patients with COVID-19 was 7.0%. Our results revealed a substantially higher prevalence of anxiety from the 1.7% national prevalence reported in the National Health and Morbidity Survey (NHMS) 2011 among the general population [28]. This demonstrates that the COVID-19 pandemic had a significant effect on mental health condition of patients. Nevertheless, our study revealed a lower prevalence of anxiety among hospitalized COVID-19 patients compared with the prevalence reported in China, which was 16.4% [29]. The initial pandemic occurred in China around November 2019 and the country has subsequently registered a higher number of cases than Malaysia. This terrible outcome is most likely the reason China has a far greater incidence of anxiety than Malaysia.

This prediction model study reported that marital status as the main predictor for anxiety. Our results found that patients who are single/widowed are 3 times more likely to develop anxiety compared to those who are married. Our findings corroborate research done in Spain[30] and China[31] among COVID-19 populations, which reported that divorced status or widower is associated with poor mental health and anxiety. As one would imagine, living alone and without a partner is associated with an elevated risk of loneliness, which is exacerbated in situations of social and physical isolation. Furthermore, a survey of older adults in London found that being widowed or divorced increased the likelihood of experiencing worsening components of anxiety after the COVID-19 lockdown[32].

During the COVID-19 pandemic, the public were exposed to an unusual environment of threats and uncertainties. Individuals who are isolated physically and socially, fear of the infection, and exposed to other stressors may be particularly susceptible to anxiety-related symptoms [12], [33], [34]. According to our study, the primary stressors contributing to anxiety are fear

of COVID-19 infection and a lack of information on COVID-19. Fear is one of the most important causes in the development of emotional issues like anxiety and stress. This is supported by a previous Indian study which found that fear of COVID-19 infection was the most common cause for suicide cases in India during the COVID-19 outbreak [35]. The availability of the internet in spreading news rapidly, especially fake and false information, may contribute to the rise of fear and consequently anxiety levels [36]. In fact, it has been shown that anxiety can be reduced by having access to the most up-to-date and correct information[37]. In this regard, mental health doctors advise using only official information sources and ignoring information obtained through unauthorised channels and unregulated sources[38].

Our study revealed that maladaptive coping strategies such as behavioural disengagement and self-blame were significantly associated with anxiety. These findings are consistent with those of prior research, which found that under the COVID-19 lockout restriction, maladaptive coping methods such as behavioural disengagement and substance abuse raised anxiety levels [39]. Self-blame typically arises after a stressful incident that has the potential to have bad results, and to which one attributes responsibility, causation, and/or intentionality to oneself. Self-blame is frequently the result of a mistaken cognition [40]. On the other hand, instrumental support was strongly linked strongly with anxiety reduction in our study. Adaptive coping may have aided in the creation of stress buffers, improved psychological well-being, and improved overall health outcomes [41]. These results are in line with those of recent research, which found that adaptive, instrumental, and social coping techniques were linked to improved stress management and reduce negative mental health consequences. [42].

STRENGTHS AND LIMITATIONS

This study has several strengths and limitations. To the best of our knowledge, this is the first research done to examine anxiety levels among hospitalised COVID-19 patients in Malaysia. This research offers early information on the mental health status of COVID-19 patients hospitalised in Malaysia during the pandemic, which should be of interest to policymakers, health facility administrators, and anyone engaged in the response to COVID-19 or any future epidemic. Besides that, findings from present study add evidence to literature specifically on the effect of mental health in inpatient COVID-19 individuals.

The limitations were: first, the research was done using a cross-sectional design, which meant that cause and effect relationships between the numerous factors in the study could not be established. COVID-19's mental health effects should be studied further to determine its long-term implications. There is a pressing need for additional extensive investigations, such as cohort studies or interventions, to be conducted in the future. Second, due to the wide dissemination of the disease, it is recommended that research with a larger sample size be conducted in more hospitals in order to obtain more accurate data. Thirdly, even though this study is a multi-centre study, the patients recruited are only from the main hospitals which are located in the town area. Thus, in terms of national representations, these data were not representative of all patients with COVID-19 in Malaysia.

RECOMMENDATIONS

The findings of this study indicate that integrated mental health interventions are required for patients infected with COVID-19. To begin, health officials must identify high-risk populations based on sociodemographic information. Based on this study, single/widower is the target populations with highest risk of anxiety. Information on early coping strategies and social support must be provided to them as this will alleviate anxiety. Secondly, public health

interventions can be improved by establishing a mental health surveillance system via online platform or telemedicine. Furthermore, health authorities need to advocate to the public and patients themselves to seek COVID-19 information only from trusted sources. Combating false COVID-19 information and disseminating accurate scientific information will help patients better understand the virus, reducing their fear and negative perception of COVID-19. Lastly, providing a supportive hospitalization environment and improving communication between patient and doctor, especially on clinical progression and prognosis of the disease will maintain relatively stable, healthy levels of psychological and physical functioning of the patients.

CONCLUSION

COVID-19 infection has had a negative impact on patients' mental health. The current study provides some valuable data on the prevalence of anxiety among COVID-19 patients in Malaysia and a complete predictive model of anxiety among them. The results showed that the prevalence of anxiety among COVID-19 patients were low. We found that being single/widower is a significant risk factor for anxiety. Fear of COVID-19, lack of information regarding COVID-19, behavioural disengagement and instrumental support were significantly associated with predictors of anxiety. Additionally, both adaptive and maladaptive coping strategies were associated with anxiety. Findings from this study has the potential to help in improving the current mental health surveillance system and implementation of appropriate interventions in managing related situations. Finally, this study serves as a springboard for future research on the psychological impact of COVID-19 in Malaysia.

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AUTHOR CONTRIBUTIONS

M.S.A.K, U.A.S., M.N.A., N.H., S.N.D., N.I., were involved in the conception and design of the research topic, and data acquisition. N.S., M.A.A.R., M.S.R. helped in analysis and interpretation of results. C.Y.Y., N.A.S., N.A.A.W., N.S., F.A.T., M.K.N.K., L.S.H. responsible for design of manuscript, revising the manuscript critically for important intellectual content and drafting of the final manuscript. All authors have read and agreed to the published version of manuscript.

INSTITUTIONAL REVIEW BOARD STATEMENT

This study was registered under the National Medical Research Registry (NMRR), Ministry of Health Malaysia (Registration number NMRR-20-711-54541) and obtained ethical approval from Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia.

CONFLICTS OF INTERESTS

The authors declare that they have no conflict of interest in any form

INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in this study.

DATA AVAILABILITY STATEMENT

The data used for this study are not publicly available due to reasons of data protection but are available from the Institute for Public Health, Ministry of Malaysia upon reasonable request and with permission from the Director General of Health Malaysia.

ETHICAL APPROVAL

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (Medial Research and Ethics Committee, Ministry of Health Malaysia) and with the Helsinki Declaration of 1975, as revised in 2000

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