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Original article

Depression and anxiety in Malaysian population during third wave of the COVID-19 pandemic

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**ABSTRACT**

**Introduction:** The outbreak of coronavirus poses deleterious consequences on global healthcare system while affecting human life in every aspect. Despite several measures undertaken to limit the socio-economic effect of coronavirus, various challenges remain pervasive, and one such challenge is mental health, particularly depression and anxiety. Therefore, this study examines the prevalence and determinants of depression and anxiety in Malaysian population during third wave of COVID-19.

**Methods:** A cross-sectional online survey was carried out via social media platforms and 1544 Malaysians were selected. The level of depression was assessed by Patient Health Questionnaires (PHQ-9) and scored accordingly for categorization. Zung’s Self-Rating Anxiety Scale (SAS) was used as a self-assessment survey to quantify the level of anxiety of persons experiencing anxiety-related symptoms. Percentage distribution and logistic regression analysis were used in the data analysis.

**Results:** Results showed that one-fourth (25.1\%) of the participants had severe depressive symptoms. Almost one-sixth (18.7\%) had mild depressive symptoms and one-third (34.1\%) had mild to moderate anxiety symptoms. Age, gender, and friends infected with virus were the three important predictors of depression and anxiety. The odds of having depression (OR = 1.44; C.I. = 1.32–1.62) and anxiety (OR = 1.36; C.I. = 1.27–1.47) were significantly higher among females than in males.

**Conclusion:** A significant proportion of the study participants were facing mild to severe depression and anxiety symptoms which is very alarming as the pandemic is still now increasing across the country. Immediate interventions including community counselling programmes, TV and social media campaigns are urgently needed to reduce the psychological stress among the Malaysian population.

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1. Introduction

The COVID-19 pandemic has made huge global impacts, including high mortality and morbidity rates, loss of income, and sustained social isolation for billions of people. The effect this crisis will have on the mental health of the population is unknown, both in the short and long term. There is minimal evidence about the acute phase mental health impacts of large-scale epidemics across communities. Existing work has focused on those individuals directly affected by the disease. The COVID-19 epidemic had a gripping impact not only on health workers, but also over general population.

A few studies from different settings investigated the role of various socio-demographic and COVID-19 related factors for mental health. Their findings suggest that women, younger people, people with chronic conditions are at severe risk of reporting mental health problems during COVID-19. In October 2020, Malaysia has entered into the third wave of COVID-19 Pandemic. Malaysia, like many other countries, relied on a lockdown strategy to curb down the menace of COVID-19. This was to ensure social distancing through home quarantine to help curb the spread of the virus among its population. However, a few studies noted an elevated risk of depression during quarantine as a result of COVID-19 pandemic. There are clear reasons to expect that these government policies and physical distancing measures aimed at limiting disease spread will impact the mental health of the community. For instance, loss of employment, financial strain, and social isolation are all well-documented correlates of mental health problems. In many countries, these measures have already resulted in an enormous increase in unemployment, likely causing significant financial strain for many.

Mental health disorders are a tremendous public health concern throughout the world. The recent third wave of COVID-19 pandemic in Malaysia had caused anxiety and fear toward the virus due to the complex pathogenicity of the virus and its constantly mutating nature. There is an inadequate attention paid to the understanding and studying the associated factors and prevalence of depression and anxiety during the third wave of the COVID-19 pandemic in Malaysia. Most of the recent studies done in Malaysia are studies conducted on university students and the study period was during the initial stage of the pandemic. The lack of knowledge implies that Malaysia cannot fully aid and support her citizen as they encounter the unprecedented COVID-19 pandemic. This study is the first to correlate depression and anxiety during the third wave of the COVID-19 pandemic in Malaysia. An online cross-sectional multi-country study has failed to link mental health and COVID-19 pandemic relation. Therefore, there is a need to explore possible association between COVID-19 and mental health. This study intends to examine depression and anxiety during third wave of COVID-19 in Malaysian population.

2. Methods

2.1. Study setting and population

The study was conducted following the protocol and approved by the Ethics Committee of Asia Metropolitan University (Project ID Number: AMU/MREC/FOM/NF/09/2020). Furthermore, a consent was taken from the respondents too. An internet-based cross-sectional survey was conducted from January 15, 2021, to April 15, 2021, during the movement restriction took place, and the number of cases and deaths from COVID-19 was increasing in Malaysia. The snowball sampling method was used for the data collection using research networks of universities, hospitals, friends, and their relatives. The survey was
many people and this way, the study adopted the snowball sampling. Participants were requested to roll out the online questionnaire to as many people as possible. The google form was set up for anonymous responses without identifying their emails or contacts. All participants were informed about the survey and provided their informed consent before starting. A total of 1554 respondents completed the survey.

The google doc link was sent through WhatsApp, Facebook, emails, and various social media platforms to the contacts of the authors, and participants were requested to roll out the online questionnaire to as many people as possible. In Malaysia, the working age started at 15 years, and the respondent aged 15 years or more were included in the study. The participant was only permitted to respond once by setting the feature that prevents more than one response. The google form was set up for anonymous responses without identifying their emails or contacts.

Table 1
Socio-demographic and economic profiles of the respondents.

| Variables      | Frequency | Percent |
|----------------|-----------|---------|
| Gender         |           |         |
| Male           | 402       | 25.9    |
| Female         | 1152      | 74.1    |
| Age            |           |         |
| 15 to <17 years| 47        | 3.0     |
| 17–20 years    | 321       | 20.7    |
| 21–24 years    | 675       | 43.4    |
| ≥24 years      | 511       | 32.9    |
| Residency      |           |         |
| Urban (town/city)| 1318   | 84.8    |
| Rural (countryside) | 236   | 15.2    |
| Race           |           |         |
| Malay          | 887       | 57.1    |
| Chinese        | 186       | 12.0    |
| Indian         | 384       | 24.7    |
| Others         | 97        | 6.2     |
| Marital status |           |         |
| Married        | 177       | 11.4    |
| Single         | 1328      | 85.5    |
| Divorced       | 12        | 0.8     |
| Widowed        | 37        | 2.4     |
| Occupational status |       |         |
| Full-time      | 450       | 29.0    |
| Part-time      | 58        | 3.7     |
| Unemployed/Homemaker | 122  | 7.9     |
| Student        | 924       | 59.5    |
| Family income  |           |         |
| Less than RM 4,849 | 825   | 53.1    |
| Between RM 4,849 - RM 10,959 | 512 | 32.9    |
| More than RM 10,960 | 217  | 14.0    |
| Educational status |       |         |
| No formal education | 8    | 0.5     |
| Primary        | 10        | 0.6     |
| Secondary      | 176       | 11.3    |
| Post-secondary education | 445 | 28.6    |
| Tertiary       | 915       | 58.9    |
| Anxiety responses |       |         |
| Normal         | 876       | 56.4    |
| mild to moderate | 530  | 34.1    |
| Severe         | 134       | 8.6     |
| Depression responses |     |         |
| None           | 192       | 12.4    |
| Mild           | 290       | 18.7    |
| Moderate       | 330       | 21.2    |
| moderately severe | 352  | 22.7    |
| Severe         | 390       | 25.1    |

piloted on a sample of 50 to test its validity. The data from the pilot survey were not included in the final analysis. All participants were informed about the survey’s purpose and provided their informed consent before starting. A total of 1554 respondents completed the survey.

2.2. Study measurement

Patient Health Questionnaires (PHQ-9) is a widely used instrument to measure and screen the overall presence and level of depression and is an easy tool to be used in a survey. It comprises nine questions, and participants were asked to select a score on each question from the survey, which scores as ‘0’ for ‘not at all’ to ‘3’ for ‘nearly every day.’ The scores are categorized into different categories whereby score (5–9) is deemed to have minimal symptoms. Meanwhile, score (10–14) is mild depression, and score (15–19) is moderately severe depression. For score (>20) is said to be severe depression. Participants were asked to select a score on each question from the survey.

In addition, Zung’s Self-Rating Anxiety Scale (SAS) is a self-assessment survey to quantify the level of anxiety for patients experiencing anxiety-related symptoms. There are fifteen questions worded toward increasing anxiety levels and five questions worded toward decreasing anxiety levels. Participants were asked to elaborate on each response. Each question is scored on a scale of 1–4 (none or a little of the time, some of the time, good part of the time, most of the time). The scores were ranged from 20 to 80, where the normal range is between 20 and 44, mild to moderate anxiety levels is from 45 to 59 and (60–74) is marked to severe anxiety levels, and extreme anxiety levels is from (75–80).

2.3. Validity & reliability

The diagnostic validity of the PHQ-9 was shown in studies involving multiple primary care and obstetrical clinics. PHQ-9 has a sensitivity of 0.80 and a specificity of 0.92 for major depressive disorder. Research conducted in 2019 had shown that the Cronbach alpha of PHQ-9 has a great satisfactory result of 0.87 and convergent validity with the BDI-II scale [Pearson’s correlation of 0.88, (p < 0.01)]. This tool has also been shown to be reliable in COVID-19 related studies various studies have used this tool before.

Meanwhile, Zung’s Self-Rating Anxiety Scale (SAS) has also proven reliable and valid to assess the scale of the most common general anxiety disorders. In a recent study, Zung’s SAS has demonstrated good psychometric properties (Cronbach’s alpha of 0.897 and intraclass correlation of 0.913). This tool also has been used in previous COVID-19 related studies.

2.4. Data analysis

The data obtained was entered in an excel sheet, and responses were coded appropriately. Statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) (v.21). Descriptive statistics were performed for demographic details along with depression and anxiety scores. Depression and anxiety scores were classified on a 4 point Likert scale. The chi-square test of proportion was performed to analyze the demographic details further. Binary logistic regression was performed for selected variables with predictors of depression and anxiety. Binary logistic regression was used to identify variables influencing depression and anxiety among students by categorizing the outcome variable into two categories, i.e., depressed = ‘yes’ and ‘no’ and anxious = ‘yes’ and ‘no,’ which would provide a clearer idea about how intensely different factors are influencing the outcomes. The results were interpreted and depicted appropriately in tables with 95% CI and p < 0.05, considered to be significant.

3. Results

Fig. 1 depicts the percentage of Malaysians by level of anxiety during the third wave of COVID-19 in Malaysia. Results noticed that more than half of the surveyed respondents (56.4%) did not report anxiety. Around one-third (34.1%) of the respondents reported mild to moderate anxiety and almost 9% reported severe anxiety.
Table 2 shows the prevalence of depression and anxiety among Malaysian individuals. Females (29.5%) had higher depressive symptoms than the male (12.4%) counterparts, whereas students (26.5%) showed higher depressive symptoms than other occupation groups. Depression was also prevalent among single individuals (26.5%) than married or divorced individuals. Besides, individuals living with in urban areas (21.9%) showed moderate depressive symptoms. In the case of anxiety, 454(87.7%) females exhibited mild to moderate anxiety symptoms. Out of the total participants, 320 (34.6%) students suffering from an anxiety disorder, also tertiary education 289 (31.6%) showed mild to moderate anxiety. Like depression, anxiety was also prevalent mostly among single individuals 471 (35.5%). Moreover, individuals living in urban areas (33.7%) also showed symptoms of anxiety.

We applied inferential statistics to establish the association between the different variables/items of questionnaires that we recorded. Binary logistic regression was applied, and OR (odds ratio) was calculated to analyze the risk of anxiety and depression with the independent variables. Individuals above 17 years of age had more depression and anxiety symptoms than those with no such worries. Students living apart from families were 2.6 times (95% CI: 1.318–1.620; 1.273–1.473) more likely to exhibit anxiety symptoms. Respondents who exercise were approx. 1.480 times more likely to exhibit depression and anxiety symptoms. Participants whose friends are not infected (Table 3). More than 70% of the individuals were female (74.1%), and the rest were males. Majority of the individuals lived in urban areas 1318 (84.8%). More than a half of the individuals were Malay 887 (57.1%) and over half of individuals were students 924 (55.1%).
Table 3
Summary of the Binary logistic regression model for predicting depressive and anxiety symptoms.

| Variables                        | Depression OR(95% CI) | P-value | Anxiety OR(95% CI) | P-value |
|----------------------------------|-----------------------|---------|--------------------|---------|
| Age                              |                       |         |                    |         |
| 15 to < 17 years (Ref)           |                       |         |                    |         |
| 17–20 years                      | 4.49 (.69–27.16)       | .003    | 1.97 (.03–11.81)   | .192    |
| 21–24 years                      | 2.94 (.14–59.08)       | .28     | 1.67 (.02–11.06)   | .319    |
| >24 years                        | 1.72 (.02–11.06)       | .001    | 1.21 (.02–11.81)   | .435    |
| Gender                           |                       |         |                    |         |
| Male (Ref)                       |                       |         |                    |         |
| Female                           | 1.44 (.01–14.26)       | .000    | 1.36 (.01–12.98)   | .000    |
| Residency                        |                       |         |                    |         |
| Urban (town/city) (Ref)          |                       |         |                    |         |
| Rural (countryside)              | 0.83 (.52–1.33)        | .916    |                    |         |
| Family’s source of income affected | 0.61 (.44–0.84)       | .003    | 0.83 (.52–1.33)    | .000    |
| New hobby                        | 1.38 (.30–1.70)        | .000    | 0.99 (.37–1.25)    | .000    |
| Privacy in home                  | 1.72 (.17–1.75)        | .000    | 1.59 (.12–1.99)    | .000    |
| Performing exercise              | 1.48 (.19–1.11)        | .000    | 1.64 (.19–1.11)    | .000    |
| Victim of abuse                  | 0.25 (.09–.73)         | .011    | 0.29 (.08–.94)     | .003    |
| Currently infected with virus    | 1.67 (.62–4.53)        | .000    | 0.95 (.48–1.90)    | .467    |
| Infected with virus in the past  | 0.21 (.01–1.72)        | .000    | 0.80 (.37–1.72)    | .000    |
| Family member infected/affected with virus | 0.83 (.46–1.49) | .000    | 0.97 (.46–1.49)    | .000    |
| Friends infected with virus      | 1.48 (.15–1.69)        | .000    | 1.59 (.15–1.69)    | .000    |

health when the number of cases surged rapidly even a year after the COVID-19 pandemic began. During this third wave of the pandemic, it was found that 70% of the respondents suffered from moderate to severe depression and 43.5% mild to severe anxiety. A systematic review reported that the rates of depression during the first wave of the pandemic be between 14.6 and 48.3% and rates of anxiety to be between 6.33 and 48.3%. There seems to be an increasing trend for anxiety and depression during this period. Moreover, upon further examination, it is revealed that those systematic reviews also included studies with significant methodological issues, which prevented a robust conclusion from being made. The very nature of the exercise, which is highly heterogeneous, prevents the appropriate conclusion from being made. Also, the main motivation factor for exercising seems for weight loss, while stress and low mood can both enable and prevent people from exercising. Hence, perhaps participants in our study exercise to manage their weight issues, and it is this problem with the weight that predisposes them to low mood and anxiety. Previous studies have indeed found that the increase in body weight raises the risk of developing anxiety and depression, especially among young women. All in all, it is probably reasonable to conclude. However, there is a lack of robust evidence that physical activity protects against anxiety and depression; it may still be beneficial, primarily when used together with medication of psychotherapy.

On the other hand, our study also found that having family income affected by the pandemic is a predictor for depression, but not anxiety. The association between income and mental health has been well documented. It has also been reported that the mass quarantine, a measure to control the outbreak’s spread, causes reduction or loss of income. However, this study found that loss of income is a predictor for depression rather than anxiety. Perhaps it is the nature of this pandemic, which is prolonged with no end in sight that causes depression to take over. Also, more importantly, the temporal association between this study and the third wave of the COVID-19 pandemic. The recent surge in the number of cases prior to the research may trigger a depressive episode in the participants.

The final intriguing predictor for depression found in this study has privacy at home. There is a lack of research to support this finding. However, self-isolation is a symptom of depression. It could be that having privacy means that they are allowed to self-isolate, and it is depression that predicts self-isolation, not the other way around. Nevertheless, more research needs to be done to understand this phenomenon.

5. Limitations of the study
The distribution of the survey through online platforms introduced a recruitment bias in which only those with access to electronic devices and the internet could participate. Using cross-sectional design can only determine the association and not causation and effect. We did not assess participants’ psychological conditions before the pandemic and could not rule out pre-existing anxiety or depression in our participants. Furthermore, we did not also gather data from different pandemic stages, and hence comparisons cannot be made. All these factors limit the conclusion and applicability of the study.

6. Conclusion
Even a year on, especially following surges of cases of COVID-19,
anxiety, and depression are more prevalent than ever. During the third wave of the pandemic, almost three-quarter of participants suffered from depression, and about half of them suffered from anxiety. Predictors of anxiety and depression were included female respondents, young, single, student, domestic violence, and person who maintain regular exercise. Immediate interventions including community counselling programmes, institutional campaigns, awareness through TV and social media can be implemented to reduce the severity of depression and anxiety. It is recommended to bring forth psychiatric and psychological support; specifically, to the female gender.

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Roy Rillera Marzo: Conceptualization, data collection, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Visualization, Supervision, Writing – review & editing, Writing – original draft. Vineet Vinay: Formal analysis, Investigation, Validation. Rafidah Bahari: Formal analysis, Investigation, Validation. Shekhar Chauhan: Writing – review & editing. Deborah Anak Fo Ming: Data collection, data cleaning, data entry. Stephanie Fernandez A/P. Nelson Fernandez: Data collection, data cleaning, data entry. Colin Cornelius Pereira Johnson: Data collection, data cleaning, data entry. Agkesh Qumr A/L Thivakaran: Data collection, data cleaning, data entry. Mohammad Meshbahur Rahman: Conceptualization, Writing-review & editing. Sonu Goel: Conceptualization.

Declaration of competing interest

The authors declare that they do not have conflict of interests.

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