

The prevalence of post Covid-19 symptoms & its associated factors in patients at health clinics in Klang Valley, Malaysia

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Background: Individuals often experienced persistence of COVID-19 symptoms following recovery of COVID-19 infection. This study aimed to determine the prevalence of post COVID-19 symptoms and factors associated with its presence (fatigue, depression, anxiety, and stress).

Methods: A quantitative study using a cross-sectional survey was carried out in 14 primary care clinics in 2023. Symptoms of fatigue post COVID-19 were evaluated using the fatigue severity scale (total score of 36 or more indicates fatigue) and presence of depression, anxiety and stress were evaluated using Depression, Anxiety and Stress Scale 21 (DASS-21) (mild severity and above indicates presence of depression, anxiety, and stress).

Result: The prevalence of fatigue, depression, anxiety, and stress in post COVID-19 infection respondents were 54%, 25.8%, 34% and 23% respectively. Respondents who lost the family member(s) due to COVID-19 infection and those who had incomplete vaccination were found to be at risk of fatigue. Depression was higher in younger age respondents, female gender and B40 income group. Anxiety was higher in younger age respondents, people with comorbidities of high cholesterol and heart disease and those with Category 4 and 5 COVID-19 infection; while stress was higher in younger age respondents, female gender and those who lost the family member(s) due to COVID-19 infection.

Conclusion: Fatigue, depression, anxiety, and stress affected almost a quarter of individuals with post COVID-19 infection. By identifying the determinants of these post COVID-19 symptoms, a framework of long-term prognosis of COVID-19 can be drafted to manage these groups of patients more effectively.

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The persistence of COVID-19 symptoms following recovery of the acute infection has been reported widely.¹⁻² Fatigue, one of the listed symptoms of post COVID-19, can be due to the physical disease, as well as a manifestation of an underlying psychological disorder, or both. It can be due to health-related and financially distressing conditions of the COVID-19 pandemic, various movement control orders.³ A study done in Turkey found that 64.1% of participants were categorized as psychologically fatigued and only 35.9% as normal.⁴ Using a validated questionnaire, the Fatigue Severity Scale, we are able to gauge the level of fatigue severity in post COVID-19 individual. This has been proven to be a reliable and a valid tool which can be readily used in the local clinical settings.⁵ To date, there is possibly limited studies done in Malaysia regarding prevalence of fatigue and its associated factors in post COVID-19 individuals.

On top of this, mental health consequences post COVID-19 infection was found to be significant. One meta-analysis which included nineteen studies identified that stress was the most prevalent mental health consequence (48.1%) of the COVID-19 pandemic, followed by depression (26.9%) and anxiety (21.8%).⁶ Quarantine and self-isolation were the main measures adopted to prevent the spread of the disease, resulting in an abrupt change in people's lifestyles, bringing panic and anxiety to a significant number of individuals.⁶ These negative psychological effects will eventually lead to significant impact on the individuals and the health care systems thus it is an important aspect that needs to be explored on top of the biological effects of post COVID-19 infection. So far, there is scant data available on the impact of this disease on mental health or the measures taken to limit its spread in the general population or in people who suffer from it including in the local Malaysian healthcare settings. Thus, we would like to not only explore the prevalence of depression, anxiety and stress in post COVID-19 individuals but also importantly identify the associated factors leading to these psychological effects.

The objective of this study is to determine the prevalence of post COVID-19 symptoms among individuals who have recovered from COVID-19 infection and its associated factors with a focus on fatigue, depression, anxiety and stress. This will ensure that screening of at-risk individuals is

conducted routinely and early intervention can be taken to prevent further complications especially the interruption of psychological well-being which disturbs the quality of life.⁷ Long-term consequences after COVID-19 infection can be an important burden to both society and the health care system.

MATERIALS AND METHODS

This is a cross-sectional study (physical) using self-administered questionnaires in a primary care clinic under district health office in Kepong and Gombak. Respondents are from individuals in the clinic who have a history of COVID-19 infection aged 18 and above. Sample size was calculated by using Kish's formula based on the prevalence of post COVID-19 symptoms of fatigue, depression, anxiety, and stress which was at 70%. The estimated sample size will be 324 with a statistical significance level (α) set at 5 percent. After considering a non-respondent rate of 20%, the estimated final sample size will be 388 participants.

For the study population, the inclusion criteria included adults above 18 years old and Post COVID-19 infected individuals attending primary care clinics under Health District Office Gombak, Selangor and Health District office Kepong, Wilayah Persekutuan Kuala Lumpur. The exclusion criteria were individuals with underlying mental health illness, acutely unwell during the clinic visit, unable to understand English or Malay language and pregnancy. Data collection was done over a six month period from 1st September 2022 until 28 February 2023.

A total of 391 respondents were approached and participated in this study. The response rate was 100% for our study from all the 14 clinics. A convenience sampling was done for post COVID-19 infected individuals attending primary care clinics via face to face.

The pre-tested questionnaire instrument included sections on socio-demography, comorbidities and COVID-19 related factors, post COVID-19 infection symptoms, Fatigue Severity Scale and Depression, Anxiety, Stress Scale-21 (DASS-21). In Fatigue Severity Scale, a total score of 36 and above was considered as having fatigue. A score of mild severity and above in DASS-21 was considered to have depression, anxiety and stress respectively.

Content validation was done with an expert panel of 2 family medicine specialists and 1 infectious disease physician. Pilot study involving 40 participants was done to ensure readability, answerability, and best possible method to conduct the study without interrupting the normal clinic flow.

Participants were selected from the triage counter during regular clinic hours. The nature and objective of study was explained to participants. A patient information sheet was given to the participant. Participants had been ensured that strict confidentiality was maintained. Informed consent was taken before filling the questionnaire. Once a participant consented, he/she was recruited into the study. The participants were told that their participation was anonymous and entirely voluntary. The researcher was around to clarify any doubt(s) that may exist.

Ethics approval was obtained from the Medical Research and Ethics Committee on 9th September 2022 (Approval No. 22-01324-B9U).

Data was analysed using a combination of statistical methods that include simple and multiple logistic regression along with Chi square and Fisher's exact test using SPSS 26.0. Univariate logistic regression test and Chi square/Fisher's exact test was done on socio-demographic, comorbidities, and COVID-19 related factors. For multiple logistic regression, for fatigue the variables that were adjusted were education, presence of family members who passed away due to COVID-19 and vaccination status. For depression, adjusted variables are age, gender, income, category of COVID-19 and heart disease. For Stress, the adjusted variables were age, gender, presence of family members living in the same household infected with COVID-19. For anxiety, the adjusted variables were age, gender, COVID-19 category, hypercholesterolemia, and heart disease. For Fisher's exact, the variables that were analysed are the socio-demographic factors. Variable that had p-value of <0.25 in the univariate analysis were then entered into multivariate analysis to look at the association between socio-demographic factors, comorbidities, and the presence of post COVID-19 symptoms (fatigue and depression, anxiety, and stress) with the p value set at < 0.05.

RESULTS

The mean age participated in this study was 35 years old ± 18.0 IQR ([Supplemental Table 1](#) and [Supplemental Table 2](#)). Females had the highest number of participants (57.3%). 99.2% of the participants were Malaysians in our study. Malay ethnicity formed the highest number of respondents (78.5%) from the total number of participants followed by Indians (14.3%) and Chinese (5.4%). Almost 57.4% had tertiary education and only 3.1% had primary education. This could be due to our target population which was mainly from the city (Klang Valley). Our respondents were mostly working (75.3%) and had a B40 income status (88.6%). None had any T20 income.

64.7% of the respondents were married. At least 99.7% of the total respondents had one family member who had a history of COVID-19 infection. However, the majority of them survived the illness (94.9%). Most of the participants were non-smokers (84.1%). The mean of the duration of our participants diagnosed with COVID-19 to the data collection is 14 months. 84.9% had COVID-19 category 1 or 2 during the bout of illness while approximately 5% had COVID-19 category 4 or 5 and was admitted for further care in hospital.

Only 19.9% of the total respondents were not vaccinated. Otherwise 35.5% had 2 doses of vaccination and 30.9% had at least the first and second booster dose.

With regards to the post COVID-19 symptoms, 69.9% of the total participants had presence of generalized symptoms from which fever had the highest number of complaints (62.1%) followed by pain the least (40.0%). 52.2% of the respondents complained of presence of ear, nose and throat symptoms from which sore throat was prevalent at 60.3% whereas the least number of complaints was for earache (9.8%).

Presence of respiratory symptoms post COVID-19 infection was high (57.5%) especially cough at 76.8% while only 34.3% from the total reported to have cardiovascular symptoms and gastrointestinal symptoms (37.6%). Almost half of the participants (50.9%) had neurological sequelae following post COVID-19 infection. Out of it, headache formed the

highest complaint at 53.6% while confusion was the least common complaint (8.3%).

Some of the participants complained of psychological symptoms (20.2%) with depression (62.0%) and anxiety (64.5%) being the most common complaint. Approximately 96-97% of the total respondents denied any dermatological symptoms or presence of any other symptoms post COVID-19 infection. 37.1% of the total respondents noted that their quality of life was affected by COVID-19 infection due to the symptoms they had post COVID-19 infection.

In terms of the prevalence of fatigue, depression, anxiety and stress, more than half of the respondents had fatigue (54%), more than a quarter of the respondents had depression (25.8%), 34% of them developed anxiety and 23% of them were reported to have stress.

For the fatigue domain, the odds of developing fatigue are 3 times higher in families which had family members who died due to COVID-19 infection ([Supplemental Table 3](#) and [Supplemental Table 4](#)). We also found that those who had incomplete vaccination are at 2.25 times higher odds to develop fatigue compared to those not vaccinated.

For the depression domain, increasing age was associated with a lower odd ratio of developing depression at 0.95 times compared to younger age groups. Females had almost twice the higher odds (AOR=1.85) to develop depression post covid compared to their opposite gender. Those who are in the category of M40 income group had 0.37 times lower odds of having depression compared to the B40 income group.

Age was found to be significantly associated with anxiety. The older age group was associated with lesser anxiety compared to the younger age group (AOR=0.96). Those who were diagnosed with category 4 and higher had almost 3 times higher odds of developing anxiety based on our findings. On the other hand, certain comorbidities such as high cholesterol and heart disease had 3- and 8-times higher odds to develop anxiety respectively (3.44, 8.10= AOR).

Age was also significantly associated with stress. The older age group reported less stress compared to the younger generation (AOR= 0.96). The females are at

almost twice higher odds (AOR =1.68) to develop stress post COVID-19 infection compared to the males. Participants who had family member(s) who died due to COVID-19 infection were found to have 3 times higher (3.08=AOR) odds to develop stress in our study.

DISCUSSION

General symptoms

This study identified not only the prevalence of post COVID-19 symptoms of fatigue, depression, anxiety, and stress but also other known post COVID-19 symptoms. COVID-19 patients may have a wide range of clinical manifestations.

Fever as one of the generalized symptoms has been reported to be the major complaint with 58.66% respondents.⁹ It is most likely a manifestation of the body's immune response to the viral replication to augment immunity.⁹

As reported in a systematic review, cough as one of the respiratory symptoms had become the most common manifestation with 54.52% respondents. Cough might result from the invasion of vagal sensory neurons by SARS-CoV-2 or a neuro-inflammatory response, or both, leading to peripheral and central hypersensitivity of cough pathways. It improves release of secretions and particles from airways as a result of irritating mechanisms, such as accumulated secretions, postnasal drip, and pathogens, in addition to inflammatory processes.⁹⁻¹¹

Headache is the most common neurological sequelae of post COVID-19. Possible explanations are direct neuro-invasion with damage to the neuronal pathway and indirect effects mediated by low blood oxygen, high blood pressure and cytokine storm on the central nervous.¹⁰⁻¹¹

Fatigue

The presence of fatigue post-COVID-19 affects one's life socially, materially, and spiritually. In this study, more than half of the respondents had fatigue. This prevalence is supported by other studies (Salari et al Mandal et al Mahmud R et aland Ebru Mogul et al where the prevalence of fatigue post-COVID-19 ranging from 45.2% to 69.9%.^{3-4,12-13} These shows that fatigue is highly prevalent not only in hospitalized

patients but also in general population post COVID-19 infection. There are multiple causative factors that leads to fatigue post COVID-19 including variety of biological or physical dysfunctions (e.g., genetic factors), cytokines released by SARS-CoV-2 infection that impair psychological defense mechanisms, social factors (e.g., socioeconomic status) as well as psychological factors (e.g., emotional stress).¹⁴

Our study found that loss of family member(s) due to COVID-19 and incomplete vaccination (received only one dose of COVID-19 vaccine) individuals were at risk of developing fatigue post COVID-19. Loss of family member(s) brings grief which encompasses emotional, cognitive, physical, and behavioral responses which is a common reaction after a loss.¹⁵

However, people who experienced COVID-19 related grief report more severe grief than people who grieved because of natural losses.¹⁶ Therefore, relatives of patients with COVID-19 felt more burdened by the pandemic compared to those suffering from other illnesses which might explains the higher odds of fatigue in this population.¹⁷ Post-COVID-19 vaccination syndrome could explain the higher prevalence of fatigue in incomplete vaccination compared to unvaccinated individuals. Fatigue was reported to be one of the common, mild to moderate, non-serious side effect of COVID-19 vaccinations.¹⁸

Participant that was identified to have moderate to severe fatigue (Fatigue Severity Scale score of 4 and above) was referred to the liaison medical officer at the respective study site. During the first follow up, we suggest the medical officer to assess the participant biopsychosocial aspect of fatigue and for non-pharmacological management including low level stretching and strengthening exercise and limiting vigorous intensity physical activity until 2-3 weeks after the post COVID-19 symptoms resolve. We suggest that the participant to be referred to physiotherapist and occupational therapist for education on exercise. We suggest that the participant to be given the next follow up in one month time. During the second follow up, the participant will undergo further evaluation including blood investigations (full blood count, blood sugar (fasting or random) and thyroid function test) if there are persistent or worsening fatigue symptoms and arrange for further follow up. During the next follow

up, the participant will be treated if indicated based on blood investigations taken and referred to family medicine specialist of the respective study site or medical physician if persistent or worsening fatigue symptoms despite normal blood investigations for further management and follow up.

Depression

In this study, the prevalence of depression is 25.8%. Depression was reported to be higher in female, younger age respondents and B40 income groups. A study by Charest et al mentioned gender, previous psychiatric history, psychopathology at 1 month follow up and systemic inflammation during acute phase are the main factors associated with depression.¹ Female gender was found to be one of predictors of depression at three-months follow up in a multivariate analysis. Female gender have a higher prevalence of depressive symptoms compared to male gender.¹⁹ Biological differences on the expression of angiotensin-converting enzyme-2 (ACE2) and transmembrane protease serine 2 (TMPRSS2) receptors between males and females, and immunological differences, e.g., lower production of pro-inflammatory interleukin-6 (IL-6) after viral infection in females, explain the higher development of post-COVID symptoms.²⁰

Until now there is no study to relate between younger age and depression. Exposure to digital content including mental health illness and being able to report symptoms readily might be the reasons this younger age group had high prevalence of developing depression. Study from a local university in Malaysia found that there is correlation between the B40 income group with depression.²¹ This group is more vulnerable to experiencing severe depression. It is a result of economic turmoil that happened during the outbreak that affected around the globe and resulted in retrenchment. Individual concerns about the financial level, unemployment when being fired and the future of the family which disrupt the emotional balance among low-income families.

Anxiety and Stress

A study by Delpino et al which included 2 million participants, shows the general prevalence of anxiety was 35.1%, affecting approximately 851,000 participants. The above data are consistent with 34%

respondents in this study. However, the study also shows there are no significant difference in the prevalence in low and middle-income countries (35.1%; 95% CI: 29.5 % to 41.0%) to high-income countries (34.7%; 95%CI: 29.6 % to 40.1%).²²⁻²⁴

One study showed that there are multiple associated factors that lead to severe COVID-19 and mortality including cardiovascular disease. This correlates with this study that showed the association between anxiety post COVID-19 and heart disease.²²⁻²⁴

This study also found an association between anxiety and dyslipidemia. It can be explained as they are defaulters during pandemic, thus it increases the risk of getting cardiovascular disease hence increasing the risk of severity, mortality and morbidity of Covid-19 infection. However, further study had to be explored to find association between hyperlipidemia and anxiety in the future.²⁵

A local study done among hospitalized COVID-19 patients showed a significant association between the severity of COVID-19 infection with anxiety, whereby category 3 had the highest proportion of anxiety (92.3%) followed by category 5 (90.9%) and category 2 (87.5%), respectively. This correlates with our study which showed a higher proportion of anxiety in category 4 and 5 in comparison with category 1 and 2 COVID-19 infection.²³

According to the World Health Organization (WHO), anxiety and depression prevalence increased by 25% globally post COVID-19 pandemic.²⁶ The COVID-19 pandemic has imposed a wide variety of unprecedented challenges, and measures taken to combat the pandemic in the form of lock down, social isolation and many more of which appear to be disproportionately affecting the mental health and well-being of young adults. Anxiety and stress are emotions closely linked with each other. Stress may worsen anxiety and vice versa.

Our study show that younger age group and female gender has higher probability of suffering from stress and anxiety which is similar to one study done at Comenius University in Bratislava.²⁷ According to another study, those age 16–25 years reported higher stress than those over 45 years old (38.2% vs. 31.8%, $p < 0.05$).²¹

In this study, a higher tendency to anxiety was exhibited by female participants and participants of age group under 30 years of age. We hypothesize that the younger age group are at higher risk for anxiety and stress due to the lower socioeconomic status, poor coping mechanism and social isolation. Generally, late adolescent and adulthood is considered a vulnerable period that coincides with the onset of mental health disorders, such as anxiety and depression.²⁸ Studies conducted during the COVID-19 pandemic demonstrated strong associations between COVID-19 and COVID-19 related fear and anxiety. Some studies reported higher preponderance of female gender and Covid19 anxiety.²⁹⁻³⁰

Our study showed similar findings of higher psychological effects in female gender. As for female gender, they tend to have more psychological suffering compared to male, most likely since they are involved in the workforce that may be adversely affected by the COVID-19 pandemic, such as retail, service industry, and healthcare.

They also played a significant role in their family by providing emotional and financial support. In addition, the lockdowns had forced most women to stay at home thus resulted in reduced outings, increased home workload, and care for the ill, which contributed to psychological distress.^{23,31}

The study also shows respondents with a higher risk perception, lower household income, and poorer health literacy also showed more stress which is reflected in this study as well.²¹ In addition, the younger generation who are obligated to work has to stay at home and thus it affects them financially and socially, hence will lead to a stressful environment for them. Studies in Spain, UK, Brazil and Greece reported, elderly people has less psychopathology compared to younger people, less suicidal ideation, lower rates of depression, anxiety and stress. This might be explained by their resilience and complex experiences during previous lives.³²

This study also found that loss of family member(s) due to COVID-19 leads to stress. This could be explained by the fact that negative emotions of people bereaved by COVID-19 were found worse as compared to non-COVID-19 bereaved. Furthermore,

COVID-19 bereaved relatives had more difficulty recovering from the death of a loved one.^{17,33}

Approximately 63% of individuals with sequelae of COVID-19 have difficulty performing daily tasks, self-care, and mobility and have a social and recreational impairment with difficulty returning to work (Ceban et al, 2021).^{13,15,34}

Certain socio-demographic factors like ethnicity were not associated with post-COVID symptoms in this study population. In terms of ethnicity, this study was done in Klang Valley where most of the population is multiracial and thus equally exposed to the pandemic. This explains on the non-significant association with the post covid symptoms.

For education, the reason could be probably because the population in Klang Valley is frequently exposed to the latest pandemic news on television, social medias and from the health facility they visit, thus explaining the non-significant finding from this study. Up to date information enables them to stay abreast and reduce uncertainties

In terms of the occupational background, this could be due to the study being done in the Klang Valley and most of them had a stable job and was able to work from home, thus ensuring a stable flow of income. This is contrary to the study done by Mohd Radzniwan et al where the study was done in bigger scale in Peninsular Malaysia, Sabah and Sarawak and some had loss of income during the pandemic, contributing to the post covid-19 symptoms.³⁵ This can be taken as our limitation and future targeted research can be undertaken.

In regards to marital status, we did not find any significant relationship between the marital status and post COVID-19 symptoms as most of our respondents are young adult who are working in Kuala Lumpur. While 2/3rd of our respondents are married and have emotional support from the spouses, the balance is still young adults who are single. 88.6% of the total respondents are also reported to be in the category of B40 (earning <RM 4850). Due to the rise of cost of living, most of the people prefer to stay with family where the support is better. This has been shown in a study done by Mahazril et al where 66% of the adults who are single prefer to stay with family due to the same reason. This could explain the family and emotional support

they get, thus the non-significant association with the post Covid-19 symptoms.³⁶

Strength and Limitations

There were multiple strengths identified from this study. Firstly, this study was one of the first few studies to determine the prevalence of post COVID-19 symptoms (fatigue, depression, anxiety and stress) and its associated factors. Secondly, this study involved multiple centers in two large districts in Selangor and Kuala Lumpur which constitute a significant local population. Furthermore, participants that were identified to have fatigue, depression, anxiety and stress were referred to the respective medical officer in-charge of the clinic for further intervention including the fatigue management flow chart provided to each study site (14 clinics).

There are a few limitations noted in this study. Even though the study sample was taken from 14 health clinics located within a large urban and suburban population, our study did not cover the rural population thus limiting its generalizability. Furthermore, the cross-sectional design of this study meant that although the associated risk factors of post COVID-19 symptoms (fatigue, depression, anxiety and stress) were identified, its causality cannot be demonstrated. Finally, there was no control group of individuals without prior COVID-19 infection to compare the prevalence of post COVID-19 symptoms (fatigue, depression, anxiety and stress) and its associated factors among the group.

CONCLUSION

This study showed a significant prevalence of fatigue, depression, anxiety, and stress in post COVID-19 infection respondents which were 54%, 25.8%, 34% and 23% respectively. We had identified the risk factors associated with fatigue (loss of family member(s) due to COVID-19 infection and those who had incomplete vaccination), depression (younger age respondents, female gender and B40 income group), anxiety (younger age respondents, people with comorbidities of high cholesterol and heart disease and those with Category 4 and 5 COVID-19 infection) and stress (younger age respondents, female gender and those who lost the family

member(s) due to COVID-19 infection). By identifying these risk factors associated with post COVID-19 symptoms of fatigue, depression, anxiety and stress, framework of long-term effects of these post COVID-19 symptoms can be drawn up respectively to manage these groups of individuals early and effectively.

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