

Mental health of COVID-19 recovered individuals: A national study from Jordan

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ABSTRACT

Aim: To investigate the relationship between COVID-19 infection and subsequent long-term mental consequences among patients recovering from the disease.

Methods: A cross-sectional and survey-based study was conducted in Jordan using Google Forms during the period from March to July of 2022. The requirement to participate was that individuals be at least 18 years old and have at least one symptomatic COVID-19 infection. A total of 2,055 subjects recruited in the study. Mental health was assessed using mental health inventory-38 (MHI-38).

Results: Females represent 64.8% (n=1,182) of the sample. The mean age of the participants was 39.9±14.4 years. Subjects who recovered from COVID-19 scored slightly higher than moderate on different scales of MHI-38. These include anxiety, depression, loss of behavioral and emotional control, general positive affect, emotional ties, and life-satisfactions. The prevalence of depression among participants was 46.3% (n=952). The prevalence of anxiety among participants was 45.8% (n=942). The prevalence of loss of physical and emotional control was 47.2% (n=970). Multiple regression showed that employment status, tobacco use, and severe COVID-19 infection were associated with mental illness. Not working, using tobacco, and having severe COVID-19 infection were more likely to develop mental illness (p<0.01).

Conclusion: Individuals who recover from COVID-19 are susceptible to developing mental illnesses. Factors associated with such susceptibility include employment status, tobacco use and severity of infection. The current findings can be used in mental health interventions targeting individuals who recovered from COVID-19.

Keywords: recovered, COVID-19, mental health, depression, anxiety

INTRODUCTION

Post-COVID health conditions refer to situations that occurred after recovering from COVID-19. Similar to severe acute respiratory syndrome 1 (SARS1), individuals infected with SARS-CoV-2 virus that causes COVID-19 are expected to experience long-term health complications after recovery from infection [1]. Currently, the short and long-term health effects of COVID-19 are the focus of research by medical professionals around the world. Studies have found that individuals who have recovered from COVID-19 may experience mental health issues as well as some physical limitations [2, 3]. For example, individuals who have recovered from COVID-19 have shown signs of post-traumatic stress (PTSD), sadness, or anxiety [4-6]. In a follow-up study, patients who recovered from a serious illness in the acute phase of COVID-19 were found to be more

likely to develop mental illness six months after recovery than those with a mild form of the infection [3, 7].

Two studies have very significant results that discussed the impact of COVID-19 on mental health during COVID-19 era in general population [8, 9]. The study in [10] revealed that 66.2% out of 714 hospitalized but stable patients have PTSS. The study in [11] showed that 29.2% of 57 newly recovered patients had elevated depression (p=0.016) compared to 9.8% of the participants in quarantine. The study did not find any difference in anxiety (p=0.154). The authors in [12] conducted a study to evaluate symptoms of patients who had eating disorders during the COVID-19 outbreak and found that 37.5% of the participants reported that their eating disorder worsened 56.2% of the participants said that they also had anxiety symptoms. Another study [13] reported that 20.9% of participants with preexisting psychiatric disorders experienced worsening of the symptoms. Despite this, the report did not consider the preexisting diagnosis.

Table 1. Demographic characteristics of the participants (n=2,055)

Character	Sub-category	Number	Percentage
Gender	Male	873	42.5
	Female	1,182	57.5
What is your work status?	Unemployed	849	41.4
	Employed	970	47.2
	Retired	236	11.4
What your income level in Jordanian Dinar (1 JD)=1.4 US \$)	< 400 Jordanian Dinars	1,117	54.4
	401 to 800	765	37.2
	>800	153	8.4
What is your educational level?	≤Secondary school	529	25.7
	Diploma	248	12.1
	University student	368	17.9
	Bachelor's	695	33.8
What is your marital status	Postgraduate	215	10.5
	Not married	620	30.2
	Married	1,435	69.8
Where do you live?	City	1,130	55.0
	Village	925	45.0
What is your smoking status	No	1,214	59.1
	Yes	841	40.9
	Once	1,122	54.6
How many times did you get COVID-19?	Twice	836	40.7
	More than twice	97	4.7
	None	224	10.9
What type of vaccination did you receive?	Pfizer	547	26.6
	AstraZeneca	942	45.8
	Others	342	16.7

Although many studies have been conducted globally to assess the mental health of individuals who recovered from COVID-19, these studies have mainly focused on the local and national context of developed countries [14-16]. Few studies have been conducted to compare long-term mental effects in underdeveloped countries and across different countries, thus missing a crucial opportunity to shed light on an international sequencing on patients recovered from COVID-19 and their mental well-being [17, 18]. In addition, the long-term health effects of COVID-19 may vary according to the quality of health care provided during infection, nutritional status, and lifestyles [19, 20]. Identifying COVID-19 patients who are most likely to require assistance due to mental issues can facilitate the development of effective support strategies to manage the long-term complications of COVID-19 infection [21, 22]. Therefore, in the current investigation, the prevalence of mental illness among recovered COVID-19 patients in Jordan was investigated. In addition, factors associated with such long-term complications have been identified. The expected results can be used for mental health interventions targeting individuals who have recovered from COVID-19 in Jordan.

METHODS

The study is cross-sectional in design and was conducted in Jordan during the second quarter of 2022. The only requirement for participation was that individuals be at least eighteen years of age, live in Jordan and recovered from COVID-19 infection. A total of 2,055 participants agreed to be part of study. Data was collected using popular social media apps and sites like Facebook, Whatsapp, and Messenger. The questionnaire's introductory page contained detailed information about objectives of study and nature of survey questions. At the end of introductory page, online consent was obtained from participants before instructing them to give

their answers to survey questions. Language of questionnaire was Arabic. The estimated time to fill out the questionnaire was 12-15 minutes. The questionnaire was empirically tested on 40 subjects to ensure the clarity of its questions.

Measures

The questionnaire has two parts: the first part asked questions related to demographic information such as age, marital status, education, income, place of living, employment status, vaccination and history of COVID-19 infection. The second part was mental health inventory (MHI), a tool used to assess mental health conditions such as anxiety, loss of physical and psychological control, and depressed mood. This tool is multidimensional and contains 38 elements [23]. This Arabic version of MHI was previously validated [24]. Survey item analysis was performed as previously described [25, 26].

Statistical Analysis

G*power estimated an effect size of .30. We used .80 power and .05 significance threshold for this study. Final total sample size was set at a minimum of 1,500 to be representative of the Jordanian population. Statistical analysis was performed using SPSS 26 software (IBM Corporation, Armonk, NY, USA). Logistic regression analysis was used to examine mental health indicators of recovered patients as estimated using MHI scale.

RESULTS

Demographical Characteristics

Demographic information is shown in **Table 1**. The majority of the study sample is composed of females (57.5%), employed/retired (52.6%), low income (54.4%), married (69.8%), and non-smokers (59.1%). Mean age of sample was 40.0 years (± 14.4 years).

Table 2. Subscales for MHI among participants

Scale	Mean+SD	Range
Anxiety	35.6+7.9	9-54
Depression	15.9+3.9	4-23
Loss of behavioral	29.4+5.1	9-53
Positive affect	26.8+8.2	10-60
Emotional ties	4.5+2.0	2-12
Life satisfaction	2.66+1.0	1-6

Assessment of Mental Health Status Among Recovered COVID-19 Jordanian Patients

MHI subscales were described using prevalence, mean, standard deviation (SD), and range (Table 2). These subscales were anxiety, depression, loss of behavioral control, positive affect, emotional connections, and life satisfaction.

As shown in Table 2, slightly higher than moderate levels of anxiety, depression, and loss of behavioral and emotional control were observed. This was inferred from the subscales that lie approximately halfway from their potential ranges. The prevalence of depression among participants was 46.3% (n=952). The prevalence of anxiety among participants was 45.8% (n=942) and the prevalence of loss of physical and emotional control was 47.2% (n=970).

Assessment of Emotional Well-Being Among Recovered COVID-19 Jordanian Patients

Emotional well-being was described using psychological distress scale, psychological well-being scale, and mental health index (Table 3). The data presented in these scales showed the means of the scales that lie slightly higher than the midpoint of their respective ranges.

Table 3. Global scales & mental health index for participants

Scale	Mean+SD	Range
Psychological distress	92.2+16.2	24-142
Psychological wellbeing	49.8+9.7	14-84
Mental health index	124+17.9	38-226

Approximately 48% of participants suffer from a low mental health condition after recovering from COVID-19 infection. The prevalence of mental disorder among the participants was 1,335 (64.7%).

Predictors of Mental Health Index Among Recovered COVID-19 Patients in Jordan

Multiple regression was significant (F=6.45, p=.01). This means that there are many factors that predict mental health among recovered COVID-19 Jordanian patients. These include age, gender, income, educational level, smoking and frequency of infection with COVID-19 (Table 4). Elderly individuals, being female, having low education, low income, smokers, and having had COVID-19 more than once were more likely to have a low mental health condition compared to other individuals.

Predictors of Psychological Well-Being Among Recovered COVID-19 Patients in Jordan

Multiple regression was significant (F=3.45, p=.01). This means that there are many factors that predict the psychological well-being of recovered COVID-19 Jordanian patients. They include sex, marital status, and type of vaccine (Table 5). Male and married individuals who have received Pfizer vaccine have greater mental health compared to others.

Table 4. Predictors of mental health index among recovered COVID-19 patients in Jordan

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% CI for B	
	B	SE	Beta			Lower bound	Upper bound
(Constant)	120.5	5.1		23.4	.000	110.4	130.6
Age	-.101	.037	-.082	-2.773	.006	-.173	-.030
Gender	3.644	.974	.103	3.740	.000	1.733	5.555
Employment status	-.313	.345	-.024	-.906	.365	-.991	.364
Income	-1.727	.585	-.071	-2.955	.003	-2.874	-.581
Education	.633	.293	.050	2.159	.031	.058	1.207
Marital status	-.674	.969	-.019	-.696	.486	-2.574	1.225
Place of living	.809	.783	.023	1.033	.302	-.727	2.345
Smoking	2.519	.849	.071	2.967	.003	.854	4.183
Number of times getting COVID-19	3.078	.656	.103	4.690	.000	1.791	4.365
Type of vaccination	.345	.415	.018	.832	.406	-.469	1.159

Note: SE: Standard error & CI: Confidence interval

Table 5. Predictors of psychological well-being among recovered COVID-19 patients in Jordan

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% CI for B	
	B	SE	Beta			Lower bound	Upper bound
(Constant)	49.9	2.02		24.7	.000	46.0	53.9
Age	.028	.021	.040	1.338	.181	-.013	.068
Gender	1.78	.537	.090	3.32	.001	.729	2.834
Employment status	-.247	.195	-.034	-1.265	.206	-.630	.136
Income	.394	.330	.029	1.195	.232	-.253	1.041
Education	-.113	.165	-.016	-.681	.496	-.437	.212
Marital status	-1.393	.548	-.070	-2.545	.011	-2.467	-.320
Place of living	-.396	.442	-.020	-.896	.370	-1.263	.471
Smoking	.926	.479	.047	1.933	.053	-.013	1.866
Number of times getting COVID-19	-.709	.371	-.043	-1.912	.056	-1.436	.018
Type of vaccination	-.529	.235	-.050	-2.254	.024	-.989	-.069

Note: SE: Standard error & CI: Confidence interval

Table 6. Predictors of psychological distress among recovered COVID-19 patients in Jordan

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% CI for B	
	B	SE	Beta			Lower bound	Upper bound
(Constant)	94.7	3.5		26.8	.000	87.8	101.6
Age	.075	.036	.065	2.074	.038	.004	.146
Gender	.345	.931	.010	.370	.711	-1.481	2.170
Employment status	.159	.339	.013	.468	.640	-.506	.823
Income	-.038	.565	-.002	-.068	.946	-1.147	1.070
Education	-.135	.285	-.011	-.474	.636	-.694	.424
Marital status	-.547	.948	-.017	-.577	.564	-2.407	1.313
Place of living	-1.056	.764	-.032	-1.382	.167	-2.555	.443
Smoking	-.275	.831	-.008	-.331	.741	-1.904	1.354
Number of times getting COVID-19	-1.865	.641	-.067	-2.911	.004	-3.122	-.609

Note: SE: Standard error & CI: Confidence interval

Predictors of Psychological Distress Among Recovered COVID-19 Patients in Jordan

Multiple regression was significant ($F=8.23$, $p=.01$). This means that there are many factors that predict psychological distress among recovered COVID-19 Jordanian patients. They include age and frequency of infection with COVID-19. Older individuals who were infected with COVID-19 virus more than once experienced more psychological stress compared to the other type of participants (Table 6).

DISCUSSION

In the current study, the mental health status of individuals who recovered from COVID-19 was examined using MHI. A total of 2,055 people who had recovered from COVID-19 were included in the study. Moderate levels of anxiety, depression, and loss of behavioral and emotional control were noted. In addition, the prevalence of depression, anxiety, and loss of physical/emotional control among participants was 46.3%, 45.8%, and 47.2%, respectively. The present results are consistent with studies in other populations. For example, a study conducted in Japan and Sweden showed that approximately 37% of individuals who recovered from COVID-19 had post-COVID issues including mental health [27]. Signs of COVID-19-related panic, sadness, self-doubt, and post-traumatic stress were more prevalent in participants with COVID-19 than in non-infected participants [27]. Individuals who contracted COVID-19 with post-COVID physical problems had significantly worse mental health than those who did not. Similar results have also been reported in cohort studies of hospitalized patients with COVID-19 in Helsinki [28], a British population-based research [29], and a cohort study of the USA electronic medical records networks [30]. In the later study, depressive symptoms were associated in 10-69% of recovered individuals, clinically relevant anxiety was present in 5-55%, acute stress was present in 7-37%, and fatigue was present in 13-87% [30]. In a study from Brazil ($n=895$), significant level of depression, anxiety, and PTSD symptoms were reported in 26.2%, 22.4%, and 17.3% of individuals recovering from COVID-19, respectively [31].

The prevalence of mental illness was higher among hospitalized recovering COVID-19 patients as reported in a study from Pakistan that showed mild to very severe degrees of depression (43%), anxiety (52%), stress (42%), and PTSD (8%) [32]. In a study from Italy, including 479 patients who had recovered from COVID-19, symptoms of mental disorders and lack of focus/focus were reported in 10.2% and 20% of the

sample, respectively [33]. In a review study, mental problems such as anxiety and PTSD were linked to COVID-19 infection [34]. In general, numerous research have revealed that the COVID-19 experience has long-lasting impacts on psychological wellbeing and psychological distress, which increases the risk of mental illness, particularly anxiety disorders and depressive diseases, in the recovered individuals [35, 36].

In our study, several indicators of mental health were identified among recovered COVID-19 Jordanian patients. These factors include age, gender, income, educational level, smoking status, employment status, and the number of times COVID-19 infection. Being older, being female, not working, a smoker, and having COVID-19 more than once were more likely to have a mental illness. In a previous study, they discovered that there are significant disparities between male and female depressive symptoms in Jordan. The greater degrees of depressive symptoms among females may be due to the social and family obligations and limitations they face [37-40]. In a Saudi study, age, gender, marital status, and socioeconomic level were important indicators of emotional well-being during the COVID-19 pandemic [25]. In a previous study from Jordan, aging, being female, and marriage were associated with higher despair and anxiety and a lack of emotional and behavioral control during COVI-19 pandemic [36]. In according with the current findings, a previous study reported that psychological distress from COVID-19 infection is affected by gender and level of social support [41]. Identification of factors that can affect the mental health of recovered COVID-19 patients could be useful in interventions targeting this population.

Implications of This Study

Studies have pointed to long term effects of COVID-19 disease on mental health of recovered patients. The expected results of the suggested study will examine such long-term effects among Jordanian COVID-19 recovered patients. This study will set the stage for identification of COVID-19 patients with increased risk for long term mental complications, thus, providing early health interventions that target this population. This is expected to help in the management of long-term mental complications while maintaining confidentiality of patients [42, 43], thus, improving the quality of life among the population who have recovered from COVID-19 disease.

Limitations

The study is cross-sectional and self-report. Due to the self-reported nature of the survey, reporting bias is a possibility. To gain a deeper knowledge of the problem, it is recommended

that the future study uses qualitative or mixed methods designed to investigate factors influencing stress, anxiety and depression in individuals who have recovered from COVID-19. In addition, functional neuroimaging provides an unbiased technique for assessing depression. Thus, further investigations are needed to confirm the current findings.

CONCLUSION

In conclusion, our study showed that individuals who recovered from COVID-19 infection are prone to developing mental illnesses such as anxiety, depression, and loss of control. These findings highlight the need for long-term medical and psychosocial support programs for patients recovering from COVID-19.

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Ethical statement: This study was approved from Jordan University of Science and Technology. All the participants were notified that participation in this study was voluntary and no gift or compensation for participation in the study. The benefits and risk for participation were explained for the participants. The study did not use any data that could identify the participants of the study. The access for the data was just for the authors and the file of data was protected with password that could access just by primary investigator and authors who were participated in the study.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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