Original Article

Psychological Symptoms and Self-Medication Behavior among COVID-19 Recoverees

Sarah Mousavi[1]*, Mohammadreza Razmi Afshar[2]

Abstract

Objective: The COVID-19 pandemic has led to a surge in psychological symptoms, even after recovery. However, the measurement of psychiatric disorders requires diagnostic tools, whereas most studies, including this one, use symptom-based screening instruments. This study aimed to assess the prevalence of depressive symptoms and levels of emotional distress (stress and anxiety) among COVID-19 recoverees. It also examined the prevalence and predictors of self-medication behaviors in this population.

Method: A cross-sectional study was conducted among 400 adults who had recovered from COVID-19 and attended academic pharmacies in Isfahan, Iran. Data were collected using the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms, Depression Anxiety Stress Scales-21 (DASS-21) for emotional distress, and a researcher-designed questionnaire to assess self-medication practices. Logistic regression was performed to identify predictors of self-medication.

Results: Moderate to severe depressive symptoms (PHQ-9 ≥ 10) were reported in 35.1% of participants. Based on DASS-21 scores, 38.8% had moderate to severe anxiety, and 33.5% had moderate to severe stress. Self-medication was reported by 32.8% of participants, primarily using sedatives, antidepressants, and herbal remedies. Depression was significantly associated with self-medication (OR = 2.18; 95% CI: 1.45–3.29; P < 0.001), while anxiety and stress were not.

Conclusion: This study highlights a high prevalence of psychological symptomatology and self-medication among individuals recovering from COVID-19. Since only depressive symptoms were assessed using a validated psychiatric screening tool (PHQ-9), and no formal diagnostic criteria were applied, the results should not be interpreted as reflecting psychiatric disorder prevalence. The findings underscore the need for improved mental health support and regulation of medication access in post-COVID care settings.

Key words: *Community Pharmacy; Depression; Emotional Distress; Iran; Post-COVID-19 Syndrome; Self-Medication*

1. Department of Clinical Pharmacy and Pharmacy Practice, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran.
2. School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran.

*Corresponding Author:
Address: Department of Clinical Pharmacy and Pharmacy Practice, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Hezar Jerib Avenue, Isfahan, Iran, Postal Code: 73461-81746.
Tel: 98-31 37927072, Fax: 98-31 688864, Email: s.mousavi@pharm.mui.ac.ir

In the time since the inception of the COVID-19 pandemic, focus has moved from the acute respiratory effects of the illness, to the longer-term sequelae of COVID-19 illness, commonly referred to as "Post-COVID Syndrome" or "Long COVID" (1). This term is used to refer to a host of physical, cognitive, and psychological sequelae that persist beyond the acute illness. Psychological sequelae, such as depression, anxiety, insomnia, cognitive impairment, and fatigue, are the most commonly reported sequelae and reportedly can last for weeks or months following recovery from the acute phase of illness (2).

The relationship between post-COVID syndrome (long COVID syndrome) and psychiatric symptoms is likely multifactorial. The onset of new psychiatric symptoms may be related to biological factors associated with neuroinflammation, inflammatory effects of the virus on the central nervous system, or dysregulated hypothalamic-pituitary-adrenal (HPA) axis activity. Psychological factors and psychosocial stressors, including social isolation, financial instability, fear of reinfection, loss of loved ones, or lack of access to mental healthcare, can substantially amplify emotional distress and trigger psychiatric disorders even in people whose psychiatric history is non-existent (3, 4).

In the face of such distress, people may also resort to self-medication, which is a behavioral phenomenon, and is defined by the World Health Organization (WHO) as "the selection and use of medicines by individuals to treat self-recognized symptoms or conditions without professional supervision (5)." This definition encompasses prescription drugs and non-prescription drugs including antibiotics, sedatives, analgesics, herbal products, and psychiatric medicines.

In the context of post-COVID recovery, the connection between psychological symptoms and self-medication behavior has not been adequately investigated. A primary concern is the heightened use of psychotropic medications in the absence of a diagnosis or a supervision from a healthcare provider. It is unclear if these individuals had a pre-existing psychiatric problem or they developed symptoms after COVID-19 (6). In addition, the wide range of self-medication includes non-psychiatric medications such as analgesics, vitamins, or antibiotics that may reflect psychological distress more than physiological need, representing maladaptive coping behaviors (7). Therefore, a comprehensive understanding of what types of medications are being used, for what reasons, and the population using them would inform public health intervention.

Despite the increasing reports of post-COVID mental health challenges, little is known about how emotional distress translates into behavioral responses such as self-medication, particularly in community-based settings as well as low- and middle-income countries. The intersection between post-COVID psychological symptoms and SM behaviors remains an under-investigated yet crucial area of study.

Research Gap and Rationale

Although many investigations have focused separately on either post-COVID psychiatric symptoms or self-medication behaviors (8), few studies have addressed their co-occurrence or possible interactions together (9). Furthermore, most of the studies completed have focused on hospital-based populations or clinical settings. There is little understanding of how these symptoms and behaviors occur in a general community context—for instance, among drugstore clients—who may or may not have formal access to mental health care. Therefore, for these reasons there is an important public health need to investigate the relationship between psychological distress and self-medication behaviors in a group of post-COVID individuals.

The Present Study Aims to

1. Assess the prevalence and severity of depressive symptoms using the Patient Health Questionnaire-9 (PHQ-9), and emotional distress (anxiety, stress) using the Depression Anxiety Stress Scales-21 (DASS-21) among COVID-19 recoverees;
2. Determine the frequency and types of medications used in self-medication, with a focus on both psychiatric and non-psychiatric drugs;
3. Identify predictors of self-medication behavior, especially the role of depressive symptoms in promoting this behavior.

Materials and Methods

This descriptive, cross-sectional, and analytical study was conducted between June and September 2023 (Tir to Shahrivar 1402) in academic pharmacies affiliated with Isfahan University of Medical Sciences. The study protocol was reviewed and approved by the Ethics Committee of Isfahan University of Medical Sciences (Approval Code: IR.MUI.RESEARCH.REC.1402.151). All participants provided written informed consent. Data confidentiality and anonymity were ensured throughout the study process.

Study Population and Sampling

Adults aged 18 years or older were recruited in a two-step sampling process. First, convenience sampling was used to encounter individuals in academic pharmacies, and simple random sampling was applied through a random number table to select a final sample of participants from the group. Inclusion criteria included a self-reported and/or documented history of COVID-19 infection that was verified through previous test diagnostics, hospitalization, or antiviral treatment (e.g., remdesivir). At enrollment, no less than three months had elapsed since symptom onset. Additionally, participants were required to have lived in Isfahan for at least three months prior to enrollment in the study to ensure consistent access to health care and environmental exposure.

Inclusion and Exclusion Criteria

Eligible participants were adults (≥ 18 years) with confirmed prior COVID-19 infection and the ability to provide informed consent. Exclusion criteria were history of chronic psychiatric disorders (specifically schizophrenia, bipolar I disorder, and major depressive disorder requiring hospitalization), or chronic debilitating condition impacting communication or cognitive ability. Psychiatric history was screened with a brief structured clinical interview with a trained clinical psychologist. These criteria were established in order to limit bias from pre-existing mental health conditions, and to ensure that participants could complete the self-report measure.

Data Collection Procedure

After obtaining informed consent, data collection was performed in designated private areas of the pharmacy in the interest of confidentiality and participant comfort. There were clinical pharmacists who were part of the study team. A pharmacy student, who was supervised by a clinical pharmacist, followed a standard protocol for data collection. The protocol included conducting the following: (1) screening participants for eligibility and psychiatric history, (2) completing standardized questionnaires, (3) checking the completeness of responses in real-time, and (4) anonymizing data and entered results into SPSS version 26 for analysis.

Measurement Tools

Psychological symptoms were assessed using two validated self-report instruments:

1. **Depression Anxiety Stress Scales-21 (DASS-21)**: This 21-item scale measures the severity of symptoms experienced over the past week across three domains—depression, anxiety, and stress. Each item is rated on a 4-point Likert scale (0 = never to 3 = almost always), with subscale scores interpreted according to standardized cutoffs. The Persian version has shown strong reliability and construct validity in Iranian populations (10). Internal consistency for the scale was high across domains in prior studies, with Cronbach's alpha ranging from 0.81 to 0.90.
2. **Patient Health Questionnaire-9 (PHQ-9)**: This widely used instrument screens for depressive symptoms over the preceding two weeks. Items correspond to DSM criteria for major depressive disorder. Scores range from 0 to 27, with established cutoffs for minimal, mild, moderate, moderately severe, and severe depression (11). The Persian version has been validated with acceptable psychometric properties (α > 0.85).
3. **WHO-5 Well-Being Index**: This 5-item scale assesses subjective well-being over the past two weeks using a 6-point Likert scale (0 = at no time to 5 = all of the time). Scores are converted to a 0–100 scale, with higher scores

indicating greater psychological well-being. This index has been validated in Persian and used widely in public health contexts (12).

Self-Medication Questionnaire

A researcher-developed questionnaire with 18 items was used to measure self-medication behaviors occurring during the COVID-19 pandemic. It included self-study questions about characteristics of self-medication such as medications considered, source of information, underlying rationale for self-treatment, and medication specifics related to the use of psychiatric medications. Answers had response options as "Yes", "No", "Maybe" or "I don't know" and were prepared for numerical analysis. To establish content and face validity, six faculty members in clinical pharmacy and psychiatry supported the review of the questionnaire for validity. A pilot sample of 20 participants calculated a Cronbach's alpha value of 0.78, which indicates acceptable internal consistency for preliminary research.

Sample Size Determination

The required sample size was calculated using Cochran's formula for prevalence studies:

$$n = \frac{Z^2 \cdot P(1-P)}{d^2}$$

Assuming a 95% confidence level ($Z = 1.96$), a margin of error (d) of 0.05, and an estimated prevalence (P) of 0.4 based on previous studies reporting psychiatric symptom rates (e.g., depression, anxiety) among COVID-19 survivors, the minimum required sample size was calculated to be approximately 369 participants. To account for potential nonresponse or incomplete data, 400 individuals were initially approached.

The assumed prevalence was informed by recent literature indicating that up to 40% of individuals recovering from COVID-19 experience significant psychological symptoms (13, 14).

Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographic variables and questionnaire scores. Independent samples t-tests were used to compare mean scores of psychological symptoms (e.g., PHQ-9, DASS-21) between binary demographic groups such as gender. Chi-square tests (χ^2) were used to assess associations between categorical variables (e.g., gender and depression severity categories). For significant results, Cramér's V was calculated to determine the effect size.

Additionally, binary logistic regression analysis was performed to identify predictors of self-medication behavior. The dependent variable was self-medication (yes/no), while independent variables included psychological symptom scores (PHQ-9, DASS-21) and demographic characteristics (age, gender, marital status,

education, and income). Odds ratios (ORs) with 95% confidence intervals (CIs) and p-values were reported. Statistical significance was set at $P < 0.05$. All assumptions for t-tests and logistic regression were verified before analysis, including normality, independence, and absence of multicollinearity.

Results

A total of 384 participants completed the study. The average age was 38.1 years (SD = 13.4), ranging from 18 to 83 years. Slightly more than half of the participants were female (53.7%), and the majority were married (63%). With respect to educational status, 28.6% had attained tertiary education, and 35.4% were employed. Most respondents (96.6%) identified as Muslim. Monthly income exceeded 200 million rials (approximately 210 USD) in 38.8% of the participants. Furthermore, 76.8% of individuals reported having adequate knowledge regarding self-medication. These demographic and baseline characteristics are summarized in Table 1.

Table 1. Baseline Characteristics of the Study Population

Characteristic	Description	n
Total Participants		384
Age	Mean ± Standard Deviation (range)	8.1 ± 13.4 (18-83)
Gender	Men	178
	Women	206
Religion	Muslim	371
	Christian	1
	Other	12
Marital Status	Single	142
	Married	242
Occupation	Employee	136
	Self-employed	69
	Student	49
	Retired	35
	Other	95
Income Level	< 10 million	38
	10 - 15 million	82
	15 - 20 million	118
	> 20 million	149
Education Level	License	159
	Doctorate	110
	Diploma	95
	Below Diploma	20

Most respondents (97.3%, n = 372) reported that they engaged in self-medication. Of these, 33.3% (n = 128) explicitly self-medicated on the basis of psychological symptoms related to the pandemic, such as anxiety, depression, or stress. Most had used psychiatric-related drugs the day of or prior to considering less commonly used medications among all respondents. Of these, the most common were herbal products (35.2%), alprazolam (33.6%), propranolol (30.5%), SSRIs (21.8%), zolpidem, TCAs, lorazepam, and melatonin. Just as the types of self-medicated psychological symptoms were important, motivations for self-medication were collected and ranked from most to least frequent in the dataset included. These motivations included previous

experience with the illness, the belief that symptoms warranted self-medication but were not serious enough to consult a physician, and the perception that self-treatment was less expensive. Table 2 provides details on the self-medication motivations and self-medication behavior responses.

Table 2. Frequency and Characteristics of Self-Medication Practices among COVID-19 Recoverees

Category	Statement / Source	n
Reasons for Self-Medication	Self-treatment is cheaper than seeking medical services and seeing a doctor	142
	Medicine is easily available and provided by pharmacies or other centers	136
	The distance to the appropriate medical center is long	32
	There are not enough facilities in the medical center where we live	18
	I save my time by self-treatment	122
	I have previous experience with the disease and have enough information to deal with it	195
	I do not take my disease problem seriously	153
Sources of Information About Medications	Internet	286
	Friends	60
	Colleagues	130
	Family	105
	Your doctor	89
	Myself	72
	Other	12
Knowledge of Self-Medication	Using medications at home without doctor supervision	266
	Taking herbal medicine without a prescription after consultation	68
	Purchasing prescription drugs from herbalists instead of pharmacies	49

The DASS-21 scores showed that 49% of participants experienced at least some degree of depression, with 24.5% reporting moderate symptoms. Anxiety was present in nearly 49.2% of participants, and 45.6% reported stress symptoms of varying degrees. According to the PHQ-9, the mean depression score was 6.5 (SD = 0.49). Severity classification revealed that 40.1% experienced minimal depression, 33.6% mild, 19.8% moderate, 4.9% moderate to severe, and 1.6% severe levels of depression. The distribution of depression, anxiety, and stress scores by severity levels is visually represented in Figure 1.

The mean WHO-5 Well-Being Index score was 58.1 (SD = 18.4), indicating a moderate level of psychological well-being among the study population. Chi-square analysis revealed a statistically significant association between gender and depression scores measured by PHQ-9 (χ^2 = 4.17, df = 1, P = 0.041), with females more likely to report moderate to severe depressive symptoms. The effect size for this association, measured by Cramér's V, was 0.11, indicating a small to moderate relationship. However, no significant associations were observed between other demographic variables (including age, education, marital status, and occupation) and scores on PHQ-9 or DASS-21.

A wide range of medications was used for self-medication, as detailed in Figure 2, which depicts the frequency distribution of drugs used during the COVID-19 pandemic for prevention or symptomatic relief. Analgesics (72.9%), vitamin supplements (50.3%), and herbal remedies (47.7%) were among the most commonly used categories. Other notable agents included famotidine, zinc, levofloxacin, co-amoxiclav, diphenhydramine, and hydroxychloroquine.

With regard to information sources for self-medication, most participants cited the Internet (74.5%) followed by colleagues, family members, physicians, and friends. Pharmacies were the most common source of medication acquisition (89.8%), although many respondents also obtained medications from apothecaries or relied on leftover prescriptions at home. Unsafe self-medication practices were also reported, including the use of prescription drugs without physician supervision and purchasing medications from informal vendors.

To determine the predictors of self-medication behavior, a binary logistic regression model was applied. Variables entered into the model included age, gender, education, marital status, occupation, income, and psychological symptom scores (PHQ-9 and DASS-21). The analysis revealed that moderate to severe depressive symptoms (PHQ-9 ≥ 10) were significantly associated with a higher likelihood of self-medication (OR = 2.18; 95% CI: 1.45–3.29; P < 0.001). In contrast, anxiety and stress scores, as well as demographic variables, did not demonstrate significant associations with self-medication practices.
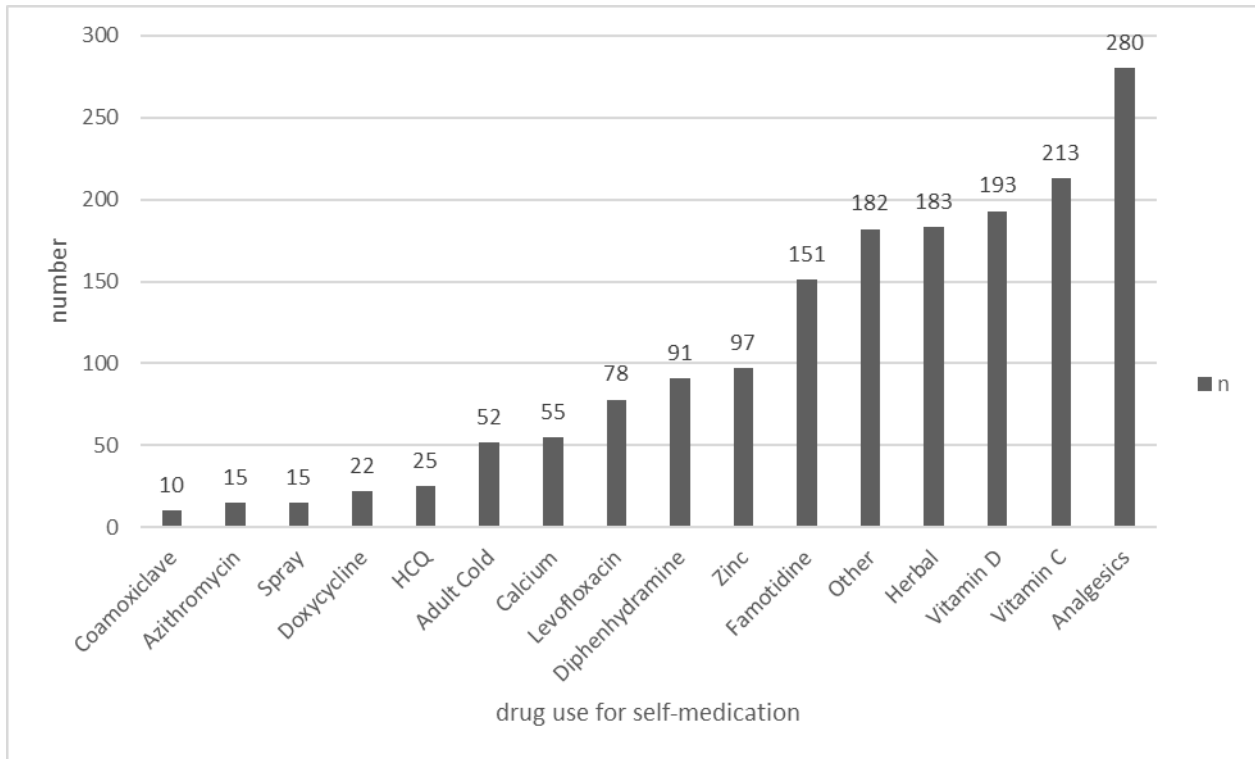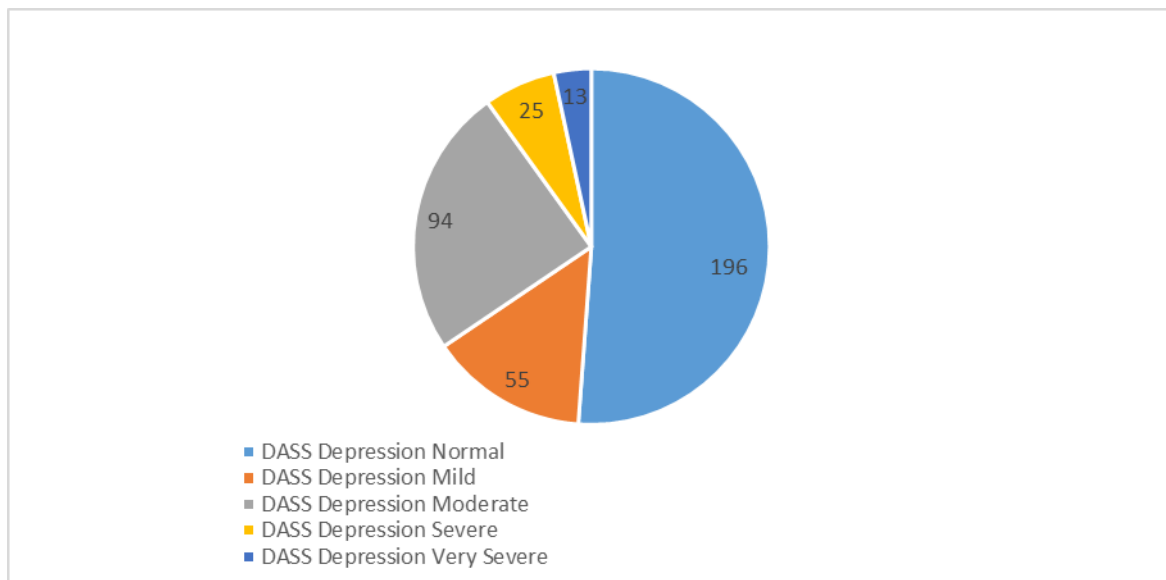

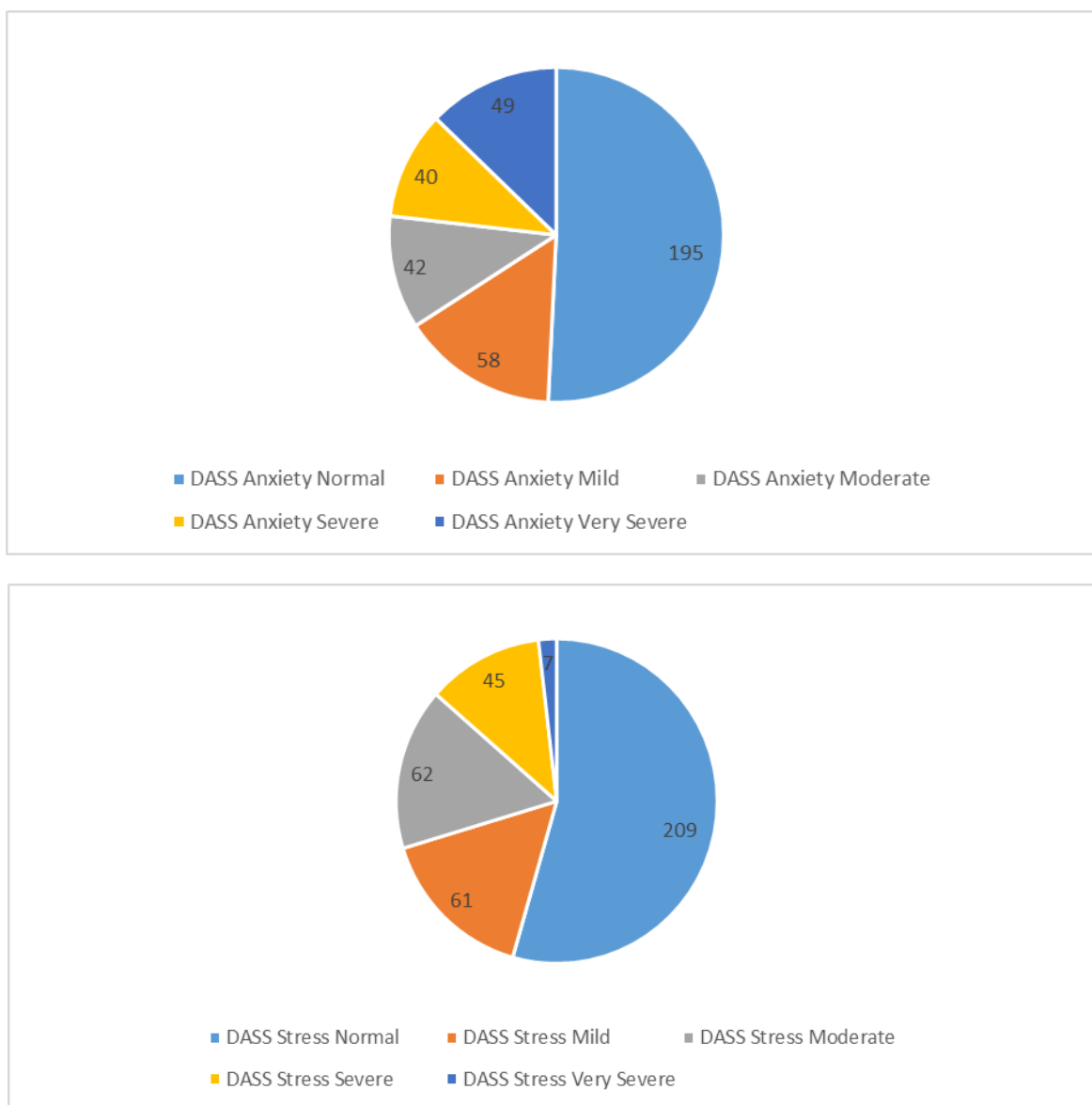**Figure 1. Frequency and Types of Substances Used for Self-Medication among COVID-19 Recoverees**

Figure 2. Levels of Anxiety, Psychological Distress, and Depression among COVID-19 Recoverees

Discussion

This study investigated the rate of self-medication (SM) and psychological symptoms in COVID-19 recovery patients who attended academic pharmacies in Isfahan, Iran. A remarkably high percentage of participants (97.3%) reported that they were engaged in self-medication, which is notoriously higher than previously reported studies. For example, a systematic review done by Shresta *et al*. (2021) (8) reported that the global rate of SM during the COVID-19 pandemic was roughly 64.7%. The rest of this paper expands on the reported psychological symptoms from patients and explains their possible ties to SM.

Multiple contextual factors may account for this disparity. Cultural norms favoring self-reliance in health decision-making, limited access to affordable mental healthcare, and widespread fear and misinformation during the pandemic may have collectively influenced the high rate of unsupervised drug use (15). Moreover, the pharmacy-based recruitment strategy likely targeted individuals already predisposed to self-treatment behaviors, introducing a selection bias that must be acknowledged.

Our results also reflect worldwide reports on the psychological sequelae of the pandemic, as we detected high rates of anxiety, depressive symptoms, and stress. The substantial gender difference in depression (with females scoring higher) is consistent with reported trends from epidemiological studies, in both Iranian studies and those published internationally (e.g., Mohammadi *et al*., 2021) (9). These findings emphasize the need for a gender-sensitive response in mental health initiatives, ensuring effective support for populations as we transition from pandemic to endemic.

The significant concern is the finding that a large number of people reported the use of psychiatric medications (e.g., alprazolam, an SSRI, or a TCA) on their own, while a professional health care provider was not involved. When used properly and under supervision, these drugs can be very helpful. However, instances of misuse raise important issues involving dependence, interaction, and the potential masking of underlying psychiatric diseases. Self-treatment can result in inappropriate treatment choices being offered, completely disregarding psychiatric problems altogether (e.g., self-medication, symptoms getting worse), and incurring delays in receiving proper psychiatric treatment (7). The strong association (OR = 2.18, P < 0.001) between moderate-to-severe depression (PHQ-9 ≥ 10) and self-medication behavior echoes the importance of identifying untreated depressive symptoms in clinical practices or in the community pharmacy.

The motivations for self-medication that participants mentioned included financial issues, prior experience with similar symptoms, availability issues, and an aversion to exposure to COVID-19 in public health care settings. These results align with other investigations (16, 17) and exemplify how the pandemic not only greatly strained formal health care systems but also subsequently changed health-seeking behaviors in unintended and harmful ways. The role of social media and informal information channels appeared to be a central figure in informing health-seeking behavior. The research findings also raise important questions about the fate of health misinformation across informal channels and about the quickly evolving nature of how people get health-related information.

It is especially concerning that antibiotics like levofloxacin, co-amoxiclav, and doxycycline are incorrectly prescribed for COVID-19, a viral illness. Antibiotic prescription under inappropriate conditions is only exacerbating the existing issue with antimicrobial resistance. Similarly, famotidine has been reported from providers, most likely based on early unverified speculation regarding its possible effectiveness against COVID-19, further highlights the public's susceptibility to partial and misleading information.

In contrast to most expectations (18), the majority of demographic variables—like age, income, educational level, and employment status—were not significantly associated with self-medication behavior. This lack of association suggests, rather ironically, that the uncertainty and fear brought on by the pandemic was stronger than sociodemographic factors in shaping people's health care choices. The only exception was the gender-based difference in depression, which future pharmacy and public health interventions need to address by incorporating considerations for psychosocial dimensions.

Limitation

I this research, several limitations should be acknowledged. First, the cross-sectional design limits any causal inferences to be made about psychological symptoms and self-medication behaviors. Second, the use of self-report measures can introduce recall or social desirability bias. Third, while both the PHQ-9 and DASS-21 are validated measures of symptoms, neither of them is a diagnostic tool. Fourth, the questionnaire on self-medication underwent pilot validation with a small sample (n = 20). While, it demonstrated acceptable reliability, this limited sample size restricts the generalizability of the findings. Lastly, the data was collected from academic pharmacies in a single city, which may not reflect national trends, reducing the external validity of the study.

Conclusion

This study offered a holistic perspective on the psychological symptom burden and self-medication in individuals recovering from COVID-19 in academic pharmacies in Isfahan. Though not representative of the larger population, the work sheds light on an important and underappreciated group of patients with untreated psychological distress who rely on pharmacy-based self-treatment. This study captures the troubling and concerning nature of unregulated psychiatric and non-psychiatric medication acquisition and use based on economic coercion, panic, misinformation, and presumed efficacy.

This study suggested a need for pharmacy-based mental health screening, public health medication education, and just access to culturally competent mental health services. Intervention strategies should focus on depression and depression-related self-medication behavior which was the strongest predictor of self-medication behavior in this study. Future investigators should be encouraged to use multi-center sampling and improve clinical diagnostic validation of these initiatives to better evaluate the psychological and behavioral impact of COVID-19 in populations with varying cultural contexts.

Acknowledgment

Conflict of Interest

None.

References

1. Lechner-Scott J, Levy M, Hawkes C, Yeh A, Giovannoni G. Long COVID or post COVID-19 syndrome. Mult Scler Relat Disord. 2021;55:103268.

2. Salamanna F, Veronesi F, Martini L, Landini MP, Fini M. Post-COVID-19 Syndrome: The Persistent Symptoms at the Post-viral Stage of the Disease. A Systematic Review of the Current Data. Front Med (Lausanne). 2021;8:653516.

3. Shanbehzadeh S, Tavahomi M, Zanjari N, Ebrahimi-Takamjani I, Amiri-Arimi S. Physical and mental health complications post-COVID-19: Scoping review. J Psychosom Res. 2021;147:110525.

4. Pierce JD, Shen Q, Cintron SA, Hiebert JB. Post-COVID-19 Syndrome. Nurs Res. 2022;71(2):164-74.

5. Bennadi D. Self-medication: A current challenge. J Basic Clin Pharm. 2013;5(1):19-23.

6. Rogers JP, Chesney E, Oliver D, Pollak TA, McGuire P, Fusar-Poli P, et al. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic. Lancet Psychiatry. 2020;7(7):611-27.

7. Malik M, Tahir MJ, Jabbar R, Ahmed A, Hussain R. Self-medication during Covid-19 pandemic: challenges and opportunities. Drugs Ther Perspect. 2020;36(12):565-7.

8. Shrestha AB, Aryal M, Magar JR, Shrestha S, Hossainy L, Rimti FH. The scenario of self-medication practices during the covid-19 pandemic; a systematic review. Ann Med Surg (Lond). 2022;82:104482.

9. Mohammadi SM, Ashtari S, Khosh Fetrat M. The psychological impact of COVID-19 pandemic on mental health of Iranian population. Int J Travel Med Glob Health. 2021;9(1):19-24.

10. Sahebi A, Asghari MJ, Salari RS. Validation of depression anxiety and stress scale (DASS-21) for an Iranian population. 2005.

11. Dadfar M, Asgharnejadfarid AA, Hosseini AF, Esfahani MN, Lester D, Kalibatseva Z. Measuring somatic symptoms with the PHQ-15: A comparative study of three Iranian samples. Mental health, religion & culture. 2020;23(3-4):289-301.

12. de Souza CM, Hidalgo MP. World Health Organization 5-item well-being index: validation of the Brazilian Portuguese version. Eur Arch Psychiatry Clin Neurosci. 2012;262(3):239-44.

13. Mazza MG, De Lorenzo R, Conte C, Poletti S, Vai B, Bollettini I, et al. Anxiety and depression in COVID-19 survivors: Role of inflammatory and clinical predictors. Brain Behav Immun. 2020;89:594-600.

14. Taquet M, Geddes JR, Husain M, Luciano S, Harrison PJ. 6-month neurological and psychiatric outcomes in 236 379 survivors of COVID-19: a retrospective cohort study using electronic health records. Lancet Psychiatry. 2021;8(5):416-27.

15. Azami-Aghdash S, Mohseni M, Etemadi M, Royani S, Moosavi A, Nakhaee M. Prevalence and Cause of Self-Medication in Iran: A Systematic Review and Meta-Analysis Article. Iran J Public Health. 2015;44(12):1580-93.

16. Yasmin F, Asghar MS, Naeem U, Najeeb H, Nauman H, Ahsan MN, et al. Self-Medication Practices in Medical Students During the COVID-19 Pandemic: A Cross-Sectional Analysis. Front Public Health. 2022;10:803937.

17. Amuzie CI, Kalu KU, Izuka M, Nwamoh UN, Emma-Ukaegbu U, Odini F, et al. Prevalence, pattern and predictors of self-medication for COVID-19 among residents in Umuahia, Abia State, Southeast Nigeria: policy and public health implications. J Pharm Policy Pract. 2022;15(1):34.

18. Kazemioula G, Golestani S, Alavi SMA, Taheri F, Gheshlagh RG, Lotfalizadeh MH. Prevalence of self-medication during COVID-19 pandemic: A systematic review and meta-analysis. Front Public Health. 2022;10:1041695.