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Elvira Hasanović *, Nataša Trifunović, Hasiba Erkočević, Irma Džambo, Zaim Jatić

Posted Date: 15 January 2026

doi: 10.20944/preprints202601.1152.v1

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Anxiety and Depressive Symptoms After COVID-19 Infection in Primary Healthcare: A Cross-Sectional Study from Sarajevo Canton

Elvira Hasanović [1,*], Nataša Trifunović [1,2], Hasiba Erkočević [1,2] and Irma Džambo [1] Zaim Jatić [1,2]

[1] Public Institution Health Center of Sarajevo Canton, Vrazova 11, 71 000 Sarajevo, Bosnia and Herzegovina

[2] Faculty of Medicine, University of Sarajevo, Čekaluša 90, 71 000 Sarajevo, Bosnia and Herzegovina

* Correspondence: elvira.hasanovic@yahoo.com

Abstract

The COVID-19 pandemic has been associated with increased psychological distress in the general population. This study aimed to examine differences in anxiety and depressive symptoms between individuals who had recovered from COVID-19 and those without a history of infection in a primary healthcare setting. **Methods:** A cross-sectional observational study was conducted in April 2022 in Canton Sarajevo. The analysis included 279 participants who completed an online questionnaire and reported no previously diagnosed mental disorder. Anxiety and depressive symptoms were assessed using the GAD-7 and PHQ-9 scales and analyzed as continuous and binary outcomes. Group differences were examined using non-parametric tests, and independent associations were assessed using multivariable regression models adjusted for relevant covariates. **Results:** Among the participants, 138 (49.5%) reported a history of COVID-19 infection. No statistically significant differences in anxiety or depressive symptoms were observed between participants with and without prior COVID-19 infection in either bivariate or adjusted analyses. Although GAD-7 and PHQ-9 scores were slightly higher in the COVID-19 group, these differences did not reach statistical significance. In contrast, female sex and the presence of chronic diseases were independently associated with higher levels of anxiety symptoms. **Conclusion:** No independent association was found between prior COVID-19 infection and anxiety or depressive symptoms in this primary care population. The findings suggest that individual and health-related characteristics may be more important determinants of psychological burden than COVID-19 infection itself in the post-pandemic period.

Keywords: COVID-19; anxiety; depression; primary health care

1. Introduction

In January 2020, the SARS-CoV-2 virus was identified as the cause of severe pneumonia and was officially designated as coronavirus disease (COVID-19) by the World Health Organization (WHO). The COVID-19 pandemic was declared on March 11, 2020, and classified as a Public Health Emergency of International Concern (PHEIC) [1]. Under these newly emerged circumstances, health authorities in Bosnia and Herzegovina (BiH), as well as in other countries worldwide, mandated the implementation of active surveillance, early case detection, isolation and management of cases, contact tracing, and measures aimed at preventing the spread of infection.

In Sarajevo Canton, which has a total population of 413,593 inhabitants, a total of 106,346 COVID-19 cases and 1,912 deaths were recorded, with a case fatality rate of 1.8% [2,3]. As a consequence of the newly emerged situation, significant changes occurred in the organization and functioning of the healthcare system in Sarajevo Canton, as well as in other settings, with the most pronounced adaptations observed at the level of primary healthcare [3,4]. As a public health emergency, the COVID-19 pandemic also had a substantial impact on mental health, creating a complex psycho-emotional environment.

 doi:10.20944/preprints202601.1152.v1

Consequently, numerous countries reported a marked increase in mental health disorders, including depression, anxiety, stress-related conditions, and sleep disturbances. These changes were associated with increased use of psychoactive substances and, in some cases, suicidal behavior. Studies conducted among individuals who recovered from COVID-19 have demonstrated a higher prevalence of depression and anxiety in this population [1–4]. Analyses of the relationship between COVID-19 and the development of depression indicate an association arising from the inflammatory response of the nervous system to SARS-CoV-2, as well as from the psychophysiological effects of the pandemic itself [2]. The impact of the COVID-19 pandemic on individuals with pre-existing depression and anxiety contributed to a worsening of symptoms of the underlying disorders or to the occurrence of relapse.

Furthermore, prolonged social isolation, job loss, and persistent fear for the health of close family members were associated with increased rates of depression and anxiety, even among individuals who had not experienced such difficulties prior to these stress-inducing circumstances.

The aim of the study was to compare the levels of anxiety and depressive symptoms between primary healthcare patients with and without a history of COVID-19 infection.

2. Materials and Methods

2.1. Study Design and Participants

A cross-sectional, observational study was conducted in April 2022, during a period when the COVID-19 epidemic was still present in Sarajevo Canton and access to family medicine outpatient clinics was limited. The study was carried out in five family medicine teams, where participants were recruited using convenience sampling during routine outpatient visits.

A total of 600 patients (120 from each team) were invited to participate in the study. Participants received a link to an online questionnaire via email, which was created using the Google Forms platform. Participation in the study was voluntary and anonymous.

A total of 352 participants completed the questionnaire (response rate: 58.7%). Of these, 35 participants were excluded due to a previously diagnosed depressive or other mental disorder, and 38 participants were excluded due to incomplete questionnaires. The final analytical sample comprised 279 participants.

2.2. Data Collection and Instruments

The questionnaire included sociodemographic information (age, sex, education, marital status, employment), health status data (presence of chronic diseases, smoking), COVID-19 vaccination status, and history of COVID-19 infection, including the year of infection and hospitalization due to COVID-19.

Anxiety symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, while depressive symptoms were evaluated using the Patient Health Questionnaire-9 (PHQ-9) scale. Both scales were analyzed as continuous scores and as binary variables based on predefined clinically relevant cut-off values. The cut-off for GAD-7 was ≥10, and for PHQ-9 ≥9, in accordance with validated and widely accepted clinical thresholds.

2.3. Statistical Analysis

Data were analyzed using appropriate statistical methods. Categorical variables were presented as absolute numbers and percentages, while continuous variables were described using medians and interquartile ranges (IQR) due to deviations from normal distribution.

For comparisons of continuous variables between two independent groups, the Mann–Whitney U test was used, while categorical variables were compared using the χ^2 test or Fisher's exact test, as appropriate.

 doi:10.20944/preprints202601.1152.v1

The primary analysis compared anxiety and depressive symptoms between participants with a history of COVID-19 infection (COVID+) and those without (COVID–). Secondary analyses included stratification of COVID-19 survivors by year of infection (2020, 2021, or 2022) and by hospitalization status due to COVID-19.

To assess the independent association of COVID-19 status with anxiety and depressive symptoms, multivariable regression models were employed. Continuous outcomes (GAD-7 and PHQ-9 scores) were analyzed using ordinary least squares (OLS) linear regression, while binary outcomes (clinically significant symptoms based on cut-off values) were analyzed using logistic regression. In all regression models, robust standard errors (HC3) were applied to reduce the impact of heteroscedasticity and improve the reliability of the estimates.

The following covariates were included in the multivariable models: age, sex, education, marital status, employment, smoking, presence of chronic diseases, and COVID-19 vaccination status. Results are presented as regression coefficients (β) or odds ratios (OR) with 95% confidence intervals (CI) and corresponding p-values. Statistical significance was set at $p < 0.05$.

2.4. Ethical Considerations

The study was approved by the Ethics Committee of the Public Institution "Primary Health Care Center" Sarajevo Canton (approval number: 01-06/3-5078-3/21, dated 22 September 2021) and conducted in accordance with the principles of the Declaration of Helsinki [5]. All participants were informed about the study objectives, voluntary participation, and data anonymity prior to completing the questionnaire, and provided implicit informed consent by submitting their responses. Data collection and storage were carried out in compliance with the applicable Law on Personal Data Protection (Official Gazette of BiH, nos. 49/2006, 76/21, and 89/2011) and the provisions of the General Data Protection Regulation (GDPR) [6].

3. Results

A total of 279 participants, who completed the questionnaire in full and did not report a previously diagnosed depressive or other mental disorder, were included in the study. Of these, 138 participants (49.5%) reported a history of COVID-19 infection, while 141 participants (50.5%) had no history of COVID-19.

Differences were observed between the groups in certain sociodemographic and health characteristics. Participants who had recovered from COVID-19 were more likely to be employed, married, and have a higher level of education; they were also less likely to be smokers and less likely to report the presence of chronic diseases compared with participants without a history of COVID-19. No significant differences were observed between the groups in terms of age, sex, or COVID-19 vaccination status.

Bulleted lists look like this:

Table 1. Baseline demographic and health characteristics of participants by COVID-19 status.

Variable	COVID– (n=141)	COVID+ (n=138)	p-value
Age (years), median [IQR]	45 [35–55]	45 [35–45]	0.461
Sex (female)	85 (60.3%)	95 (68.8%)	0.171
Education (>12 years)	97 (68.8%)	112 (81.2%)	0.025
Married	77 (54.6%)	97 (70.3%)	0.010
Employed	85 (60.3%)	118 (85.5%)	<0.001
Smoker	59 (41.8%)	35 (25.4%)	0.005
Chronic disease	63 (44.7%)	39 (28.3%)	0.006
Vaccinated against COVID-19	111 (78.7%)	112 (81.2%)	0.720

Comparison of Anxiety and Depressive Symptoms by COVID-19 Status

 doi:10.20944/preprints202601.1152.v1

In bivariate analyses, no statistically significant differences were observed in the levels of anxiety or depressive symptoms between participants with a history of COVID-19 and those without.

Continuous scores for anxiety and depressive symptoms did not differ significantly between the groups. The median GAD-7 score was 6 (IQR 4–9) in the COVID-19 group compared with 5 (IQR 3–8) in the non-COVID-19 group, with no statistically significant difference (p = 0.125). Similarly, the median PHQ-9 score was 5 (IQR 3–8) in the COVID-19 group and 4 (IQR 2–7) in the non-COVID-19 group, also without a statistically significant difference (p = 0.166).

When symptoms were analyzed according to predefined cut-off values, no significant differences were observed in the prevalence of clinically significant anxiety or depressive symptoms between the groups.

Table 2. Prevalence of clinically significant anxiety and depressive symptoms (binary outcomes) by COVID-19 status.

Outcome	COVID– (n=141)	COVID+ (n=138)	OR (95% CI)	p-value
GAD-7 ≥ 10	27 (19.1%)	31 (22.5%)	1.22 (0.69–2.18)	0.593
PHQ-9 ≥ 9	23 (16.3%)	19 (13.8%)	0.82 (0.42–1.58)	0.670

In the subsample of participants who had recovered from COVID-19, anxiety and depressive symptoms did not differ significantly according to the year of infection (2020, 2021, or 2022). No statistically significant trends were observed in GAD-7 or PHQ-9 scores across these groups.

Similarly, no significant differences in anxiety or depressive symptom levels were found according to hospitalization due to COVID-19. The number of hospitalized participants was very small, and these results are therefore not presented in a separate table.

In adjusted multivariable models, after controlling for age, sex, education, marital status, employment, smoking, presence of chronic diseases, and vaccination status, COVID-19 status was not independently associated with either anxiety or depressive symptoms.

In the adjusted linear models, participants who had recovered from COVID-19 had, on average, a 0.61-point higher GAD-7 score compared with participants without a history of COVID-19; however, this difference was not statistically significant. Similarly, COVID-19 status was associated with a 0.75-point higher PHQ-9 score on average, but this difference also did not reach statistical significance.

Table 3. Adjusted multivariable models (controlling for age, sex, education, marital status, employment, smoking, chronic diseases, and vaccination status).

Outcome	Model	Effect of COVID-19 (95% CI)	p-value
GAD-7 (score)	Linear (OLS, robust HC3)	+0.61 (−0.40 to +1.63)	0.236
PHQ-9 (score)	Linear (OLS, robust HC3)	+0.75 (−0.21 to +1.71)	0.124
GAD-7 ≥ cut-off	Logistic (robust HC3)	OR 1.40 (0.74–2.65)	0.307
PHQ-9 ≥ cut-off	Logistic (robust HC3)	OR 0.97 (0.47–1.98)	0.928

In contrast, female sex and the presence of chronic diseases were identified as independent factors associated with higher levels of anxiety. In the adjusted models, female sex was associated with a higher GAD-7 score (β = +1.63; p = 0.002), while the presence of chronic diseases was associated with an increased likelihood of clinically significant anxiety (OR = 2.70; p = 0.005).

For depressive symptoms, none of the examined variables were found to be significantly associated with PHQ-9 scores in the adjusted models.

4. Discussion

In this cross-sectional study conducted in primary healthcare settings during the COVID-19 epidemic, no independent association was found between a history of COVID-19 infection and levels

 doi:10.20944/preprints202601.1152.v1

of anxiety or depressive symptoms. The findings indicate that, although anxiety and depressive symptoms were slightly higher among participants who had recovered from COVID-19, these differences were not statistically significant after adjusting for relevant sociodemographic and health-related factors. These results suggest that the psychological burden observed during this period may be more closely related to individual participant characteristics than to a history of COVID-19 infection itself.

While some earlier studies focused on assessing the prevalence of anxiety and depressive symptoms following COVID-19, often without an appropriate control group, our study specifically compared individuals with and without a history of infection while controlling for relevant confounders. In this context, our findings are consistent with studies showing that, after adjustment for sociodemographic and health-related factors, differences in anxiety and depression levels between COVID+ and COVID− groups are reduced or no longer significant [7–9].

In our study, no statistically significant differences were observed in anxiety or depressive symptom levels between individuals who had recovered from COVID-19 and those without a history of infection, although scores were slightly higher in the COVID-19 group. These findings are consistent with parts of the literature from the general population and primary healthcare settings, which report no independent association between a history of COVID-19 and anxiety or depressive symptoms after adjusting for relevant confounders [7,8,10].

The low proportion of severe COVID-19 cases and hospitalizations in this study is consistent with findings from other studies conducted in primary healthcare and the general population, where the majority of participants experienced mild to moderate forms of the disease. Similar patterns have been reported in previously published studies from Bosnia and Herzegovina and the surrounding region [4,7,11]. Furthermore, during the study period, psychological stress was prevalent across the general population, which may have further attenuated differences between individuals with and without a history of COVID-19 [7,12,13].

In contrast, female sex and the presence of chronic diseases were identified as independent factors associated with higher levels of anxiety symptoms, which is consistent with numerous previous studies conducted during the COVID-19 pandemic [14,15]. These findings suggest that individual and health-related characteristics are stronger predictors of psychological burden than a history of COVID-19 infection itself.

5. Conclusions

In this cross-sectional study conducted in primary healthcare during the COVID-19 epidemic in Sarajevo Canton, no statistically significant differences were observed in anxiety or depressive symptom levels between individuals who had recovered from COVID-19 and those without a history of infection.

Although participants with a history of COVID-19 had slightly higher average anxiety and depression scores, these differences did not reach statistical significance. In contrast, female sex and the presence of chronic diseases were identified as independent factors associated with higher levels of anxiety symptoms.

These findings highlight the need for primary healthcare services in the post-pandemic period to focus on at-risk groups, regardless of COVID-19 infection history.

Author Contributions:

Funding:

Institutional Review Board Statement: The study was approved by the Ethics Committee of the Public Institution "Primary Health Care Center" Sarajevo Canton (approval number: 01-06/3-5078-3/21, dated 22 September 2021) and conducted in accordance with the principles of the Declaration of Helsinki [5].

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Informed Consent Statement: All participants were informed about the study objectives, voluntary participation, and data anonymity prior to completing the questionnaire, and provided implicit informed consent by submitting their responses.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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