

Original Research

COVID-19 infected patients' experiences in Syria, and the role of the pharmacists during their infection

Razan I. Nassar , Samar Thiab , Kinda T. Alkoudsi , Iman A. Basheti 

Received (first version): 28-Dec-2021

Accepted: 24-Feb-2022

Published online: 28-Feb-2022

Abstract

Background: Patients infected with coronavirus have new experiences and hence new needs from the healthcare sector. Acknowledging patients' experiences can exhibit promising outcomes in coronavirus management. Pharmacists are considered a vital pillar in managing patients' experiences during their infection. **Objective:** To assess the experience of individuals who have been infected with coronavirus and the roles played by pharmacists to meet their new needs. **Methods:** This descriptive cross-sectional survey was developed based on previous literature, validated, and conducted in Syria. The survey included items related to participants' COVID-19 experiences, and items concerning the roles played by pharmacists when participants were infected. Items were tested for face validity. Data collection was conducted in May and June 2021. Data was analyzed using the Statistical Package for the Social Sciences (SPSS). **Results:** The study participants (n=576) had a mean age of 37.99 years. Fatigue was the most reported symptom by the participants. Vitamin C was the most used supplement (76.4%), and 66.5% of the participants used herbs during their infection. More than 60.0% of the participants stated that their anxiety and stress levels increased during their infection. Around 40.0% of the participants needed to visit a specialist doctor. Only 5.4% needed to use an artificial respiration apparatus. The mean of the participants' infection severity was 4.97 (SD=2.30) out of 10. The severity of the infection was significantly affected by being older, female, smoking, and having a chronic condition. Doctors followed by pharmacists were the healthcare providers who advised participants to take certain medications/herbs. More than one-third of the participants strongly agreed/agreed that the pharmacist played important and effective roles during their infection. **Conclusion:** Patients' experiences indicated that fatigue was the most reported symptom by the participants diagnosed with coronavirus infection, while vitamin C was the most used supplement. Pharmacists have a major role in helping participants manage their infection and are considered a vital pillar in patients' experiences since they provided patients with the needed medications.

Keywords: Coronavirus; COVID-19; Pandemics; Pharmacists; Patient experience; Syria

INTRODUCTION

Since the novel coronavirus disease 2019 (abbreviated as COVID-19) was discovered in China, the virus has spread rapidly across the world. Although the Chinese authorities have adopted strict measures to reduce the spread of the disease, the COVID-19 positive cases were reported in several countries. Accordingly, the World Health Organization (WHO) declared COVID-19 as a pandemic in response to this unpredicted situation.^{1,2} The COVID-19 infection differs in severity, starting from mild symptoms such as flu-like symptoms, fever, cough,

and headache. It may progress to a serious illness such as pneumonia and even death.^{3,4}

In Syria, the first confirmed case was reported on the 22nd of March 2020,⁵ with the first confirmed death case reported after a week.⁶ According to the Syrian Ministry of Health, the confirmed cases of COVID-19 reached 32,138 by the 1st of October 2021,⁷ whilst the confirmed cases (within the same period) worldwide reached 232,122,009.⁸

After several years of war in Syria, the COVID-19 pandemic was predicted to be a notable challenge to the Syrian health sector. Consequently, the WHO warned that Syria is at high risk of the virus outbreak owing to the shortage of adequate equipment and the loss of nearly 70% of healthcare workers.^{6,9} Similar to other countries, the Syrian government imposed strict preventative measures in order to reduce the spread of the virus. For example, a partial lockdown was imposed for 12 hours starting from 6 PM, moreover, the playgrounds, marketplaces, and stores were closed completely. In addition, all flights were suspended, and traveling between cities was not allowed. On the other hand, on the 26th of May, the government started to reduce the curfew restrictions.⁹

So far, there is no proven effective treatment against COVID-19.⁴ Hence, patients infected with COVID-19 start to take over-the-counter medications and herbal products to alleviate the symptoms which appeared. And since the pharmacists provided the patients with these medications, they played a

Razan I. Nassar*. MSc. Department of Clinical Pharmacy and Therapeutics. Faculty of Pharmacy, Applied Science Private University, Amman, Jordan. R_nassar@asu.edu.jo

Samar Thiab. PhD. Assistant Professor in Pharmaceutical Analysis, Department of Pharmaceutical Chemistry and Pharmacognosy, Faculty of Pharmacy, Applied Science Private University, Amman, Jordan. S_Thiab@asu.edu.jo

Kinda T. Alkoudsi. MSc. Research intern in Nutritional Epidemiology, Department of Nutrition and Health, Luxembourg Institute of Health, Strassen, Luxembourg. kinda.alkoudsi@gmail.com

Iman A. Basheti. PhD. Professor in Clinical Pharmacy, Department of Clinical Pharmacy and Therapeutics, Faculty of Pharmacy, Applied Science Private University, Amman, Jordan. dr_iman@asu.edu.jo



major role in coronavirus management and are considered a vital pillar in patients' experience with the virus. Therefore, it is not surprising that pharmacists have been playing major roles since the beginning of the pandemic, implementing innovative strategies to decrease the negative effect of the pandemic.⁴

Millions of individuals were quarantined in their homes to reduce COVID-19 transmission, nevertheless, healthcare providers such as pharmacists were the frontline against COVID-19 infection.¹⁰ Pharmacists were dedicated to ensuring that all the pharmaceutical services were provided to the population and they had access to their medications.⁴ A study conducted in Nigeria stated that during the pandemic, pharmacists provided services to the general public directly through their community pharmacies, as they were the most accessible healthcare providers.¹¹ Another study conducted in Ghana regarding the medication management and adherence during COVID-19, assessed perspectives and experiences of patients from low-and middle-income countries; the finding of the study highlighted that pharmacists were providing care for patients with chronic diseases and promoting adherence to prescribed medications.¹² A study conducted in China -home of the outbreak- stated that pharmacists can offer various services such as emotional counselling and psychological support, as well as providing scientific information regarding COVID-19 vaccines.¹³ Moreover, it was documented in the International Pharmaceutical Federation (FIP) guidelines that pharmacists can provide reliable information regarding COVID-19 detection and prevention.¹⁴

Exploring patients' experiences with COVID-19 infection can exhibit promising outcomes; for example, reporting the symptoms experienced by patients following vaccination helps policymakers design suitable awareness campaigns, leading to a higher proportion of individuals getting vaccinated, and reducing mortality and morbidity associated with the virus.

The COVID-19 pandemic continues to spread across the globe, however, patients' experiences are rarely documented.^{15,16} No previous study has evaluated the experience of COVID-19 infected individuals, nor assessed the role of the pharmacist during their infection in Syria. Hence, the current study aims to provide an overview of the experience of Syrian COVID-19 patients and assess the pharmacist's role during participants' infection.

METHODS

Study design, subjects, and setting

This cross-sectional study was conducted in Syria, where data collection was conducted between the 16th of May to the 22nd of June 2021. During this period, Syrian people who have been infected with COVID-19 were invited to participate in this study and to complete a questionnaire. The questionnaire was developed to evaluate participants' COVID-19 experiences, and to assess the role of the pharmacist in helping them manage their symptoms during their infection. The aim and the objectives of the study were explained to the participants, with the only inclusion criteria being having a previous infection

with COVID-19 and is living in Syria.

Questionnaire development and data collection

The questionnaire was developed by the researchers after an extensive review of the literature. Face validity was evaluated by five independent researchers who are experts in research and pharmacy practice. They assessed the comprehension, relevancy, and wording clarity of the items in the questionnaire. Their feedback was considered by the research team, thus, the items were altered and rewritten based on their comments.

The final version of the questionnaire was divided into three sections. The first section dealt with participants' demographic data. The second section included items aimed at investigating participants' experience with COVID-19. The third section included items that aimed to assess the role of pharmacists in managing COVID-19 infection. The methods for item response were organized differently according to the needs of each section; in the first section, single choice questions was used; second section, single-choice, multiple-choice (option to choose more than one answer is permitted), and scales were used; while in the third section, a five-point Likert scale (i.e., 1=strongly agree, 2=agree, 3=neutral, 4=disagree, and 5=strongly disagree) was used.

Data collection was carried out using a questionnaire through the online platform 'Google Forms'. The participants were recruited mainly through Facebook and WhatsApp. Participants willing to participate were sent a link to view ethics information regarding the study. The time allocated for questionnaire completion was under 10 minutes.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Board Committee at the Faculty of Pharmacy, Applied Science Private University (Approval Number: 2021-PHA-34).

Participation in this study was completely voluntary and did not pose any risk to participants. Informed consent was obtained from participants prior to enrolment in the study. No personal data were reported. The anonymity of the participants was protected in the study, as their names were not requested.

Sample-size calculation

The sample size was calculated using a margin of error of 5%, confidence level of 95%, and response distribution of 50%. The minimum sample size that was required was 385 participants.¹⁷ We tried to approach a higher number of participants to increase the generalizability of the study.

Statistical analysis

The obtained data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), Version 24.0 (IBM Corp., Armonk, New York, USA). Categorical variables were presented as frequencies and percentages. Continuous variables were presented as mean (standard deviation). Screening of the factors affecting COVID-19 infection severity was carried out using simple logistic regression. For multiple logistic regression analysis, the variable entry criterion was set to 0.25, which mean that any variables that were found to be



significant on the single predictor level ($P < 0.25$) were entered into the multiple logistic regression analysis to explore the variables that were significantly and independently associated with COVID-19 infection severity. The severity was coded as follows [0: Low, 1: High], where "High" indicated participants who ranked their COVID-19 infection severity ≥ 7 (out of 10).¹⁸ Variables were selected after checking their independence, where tolerance values > 0.2 and Variance Inflation Factor (VIF) values were < 5 were checked to indicate the absence of multicollinearity between the independent variables in regression analysis. Simple logistic regression was also used to evaluate the influence of age on the patient's need to visit a doctor, require hospital admission, need to use a ventilator, use of herbal products, and the level of anxiety and stress during COVID-19 infection.

RESULTS

The age of the study participants ($n=576$) ranged from 18 to 90 years, with a mean of 37.99 ($SD=13.82$). Females accounted for 70.1% of the study sample. Of the participants,

Table 1. Demographic characteristics of the study sample ($n=576$)

Parameter	n (%)
Age	
18-30	216 (37.4)
31-40	164 (28.5)
41-50	85 (14.8)
51-60	69 (12.0)
61-70	29 (5.0)
71-80	8 (1.4)
81-90	5 (0.9)
Gender	
Female	404 (70.1)
Male	172 (29.9)
Marital status	
Married	311 (54.0)
Single	234 (40.6)
Divorced	16 (2.8)
Widowed	15 (2.6)
Living place	
Damascus (the capital)	419 (72.7)
Other governates	157 (27.3)
Medical insurance	
Yes	180 (31.3)
No	396 (68.8)
Smoker	
Yes	155 (26.9)
No	421 (73.1)
Working in a medical sector	
Yes	101 (17.5)
No	364 (63.2)
Not working	111 (19.3)
Have a Chronic disease(s)	
Yes	92 (16)
No	484 (84)
Asthmatic patients	
Yes	36 (6.3)
No	540 (93.7)

54.0% were married and 72.7% were living in Damascus (the capital). Regarding the participants' health status, 84.0% did not have any chronic diseases, however, 6.3% were asthmatic patients. The detailed demographic data of the study participants ($n=576$) are as shown in Table 1.

Participant's experience

The largest number of COVID-19 infections were recorded in July 2020 (16.7%), this was followed by the next second group in August 2020 (14.6%). Forty percent of participants believed that COVID-19 was transmitted to them upon contacting infected people. Almost 85.0% of the participants informed the people they had contacted during previous days regarding COVID-19 positive status. None of the participants were

Table 2. The severity of participants' infection, symptoms accompanied with the infection, and medications used

The Question	n (%)	Responses
Rate the severity of your infection; where 1=Not severe at all - 10=Very severe	46 (8.0)	1 (Not severe at all)
	49 (8.4)	2
	71 (12.3)	3
	69 (12.0)	4
	110 (19.1)	5
	69 (12.0)	6
	85 (14.8)	7
	41 (7.1)	8
	20 (3.5)	9
	16 (2.8)	10 (Very severe)
What are the symptoms that you have experienced?	454 (78.8)	Fatigue
	399 (69.3)	Loss/change in the senses of taste or smell
	367 (63.7)	High temperature (fever)
	360 (62.5)	Muscle/Joint pain
	322 (55.9)	Headache
	241 (41.8)	Anorexia
	238 (41.3)	Cough
	218 (37.8)	Chill
	202 (35.1)	Shortness of breath
	191 (33.2)	Runny nose
	188 (32.6)	Sore throat
	176 (30.6)	Gastrointestinal symptoms (such as: nausea, vomiting and diarrhea)
	160 (27.8)	Chest pain
74 (12.8)	Eye pain	
68 (11.8)	Drop in blood pressure	
67 (11.6)	Pneumonia	
What medications or nutritional supplements did you take?	440 (76.4)	Vitamin C
	394 (68.4)	Pain relievers such as Panadol
	315 (54.7)	Vitamin D
	285 (49.5)	Zinc
	280 (48.6)	Antibiotic (e.g., Azithromycin)
	142 (24.7)	Blood thinner (e.g., Aspirin/Heparin)
	132 (22.9)	Cough syrup
	115 (20.0)	Cortisone
	104 (18.1)	Vitamins in general
	59 (10.2)	Medicines for stomach (e.g., Nexium/Lanzor)
	34 (5.9)	Antivirals (e.g., Favipiravir/ Remdesivir)
	22 (3.8)	Intestinal antiseptic (e.g., Ercefuryl)
	8 (1.4)	Antiparasitic (e.g., Ivermectin)
	6 (1.0)	Anti-mitotic (e.g., Colchicine)
3 (0.5)	Immunosuppressant (e.g., Actemra)	
34 (5.9)	I did not take any medication	



vaccinated before their infection.

Table 2 shows how the participants ranked the severity of their infection; the mean of the participants' infection severity was 4.97 (SD=2.30) out of 10. The most common symptom documented by participants was fatigue (78.8%), followed by loss/change in their sense of taste or smell (69.3%), and high temperature (63.7%). The time it takes for smell and taste to return varied widely from one participant to another (one day (3.6%), two days (3.8%), three to seven days (32.8%), one to two weeks (16.6%), two to three weeks (9.2%), three to four weeks (11.5%), one to two months (10.3%), more than two months (12.1%). Regarding the use of medications/supplements, vitamin C ranked first as most frequently used (76.4%), followed by pain relievers (68.4%), and vitamin D (54.7%). On the other hand, there were 34 participants who did not take any medication (Table 2). When participants were asked whether they used herbs such as ginger, clove, and anise during their infection, 66.5% answered "Yes"; and out of these participants, 83.2% stated that the herbs were helpful.

Regarding whom advised the participants to take the medications/nutritional supplements, 62.5% were advised by the doctor, 11.1% were advised by the pharmacist, 2.6% were advised by a family member/friend who is a healthcare professional, 5.7% read the information on medical articles, 4.7% read the information on social media, and 13.4% did not consult anyone before taking the medications.

During the participants' infection, 40.8% needed to visit a specialist doctor. Only 5.4% needed to use an artificial respiration apparatus. No more than 30 participants were admitted to the hospital, and from those participants, 15 participants were admitted to the ICU. Regarding receiving medical consultation services such as securing oxygen cylinders and sterilizing the house by a community initiative such as

Table 3. Assessment of factors affecting the COVID-19 infection severity among study participants (n=576)

Parameter	COVID-19 Infection Severity [0: Low, 1: High]			
	OR	P-value [#]	OR	P-value [§]
Age	1.044	<0.001	1.033	<0.001*
Gender				
• Male	Reference			
• Female	0.630	0.019	0.656	0.047*
Smoking				
• No	Reference			
• Yes	0.708	0.114	0.691	0.112
Chronic disease (e.g., hypertension and diabetes)				
• No	Reference			
• Yes	3.541	<0.001	1.926	0.016*
Asthmatic patient				
• No	Reference			
• Yes	1.300	0.474	-----	-----

#Using simple logistic regression, §Using multiple logistic regression, *Significant at 0.05 significance level

Aqmha and Sama't Hakim application, 10.5% documented that they requested these services.

More than half of the participants (51.0%) were measuring the oxygen saturation in their blood; the mean for the participants' oxygen saturation was 89.17 (SD=11.33).

Around 70.0% (n=403) of the participants did not do the COVID-19 test, 22.4% did the test in a private sector lab, 6.3% did the test in a public sector lab, and 1.9% tested in both sectors. From the participants (n=173) who did the COVID-19 test (nasal swab), 73.2% documented that it was bothersome, 9.0% documented that it was painful, and 17.8% documented

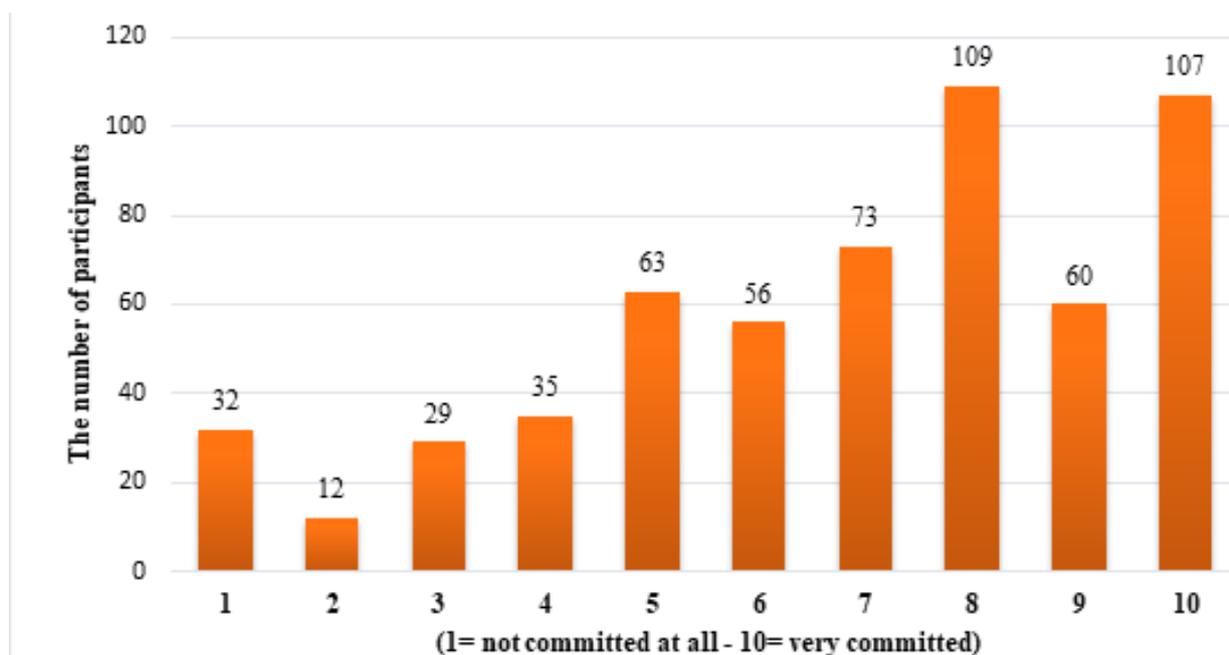


Figure 1. Participants' commitment to preventive measures before getting infected with the coronavirus (ranked by themselves).



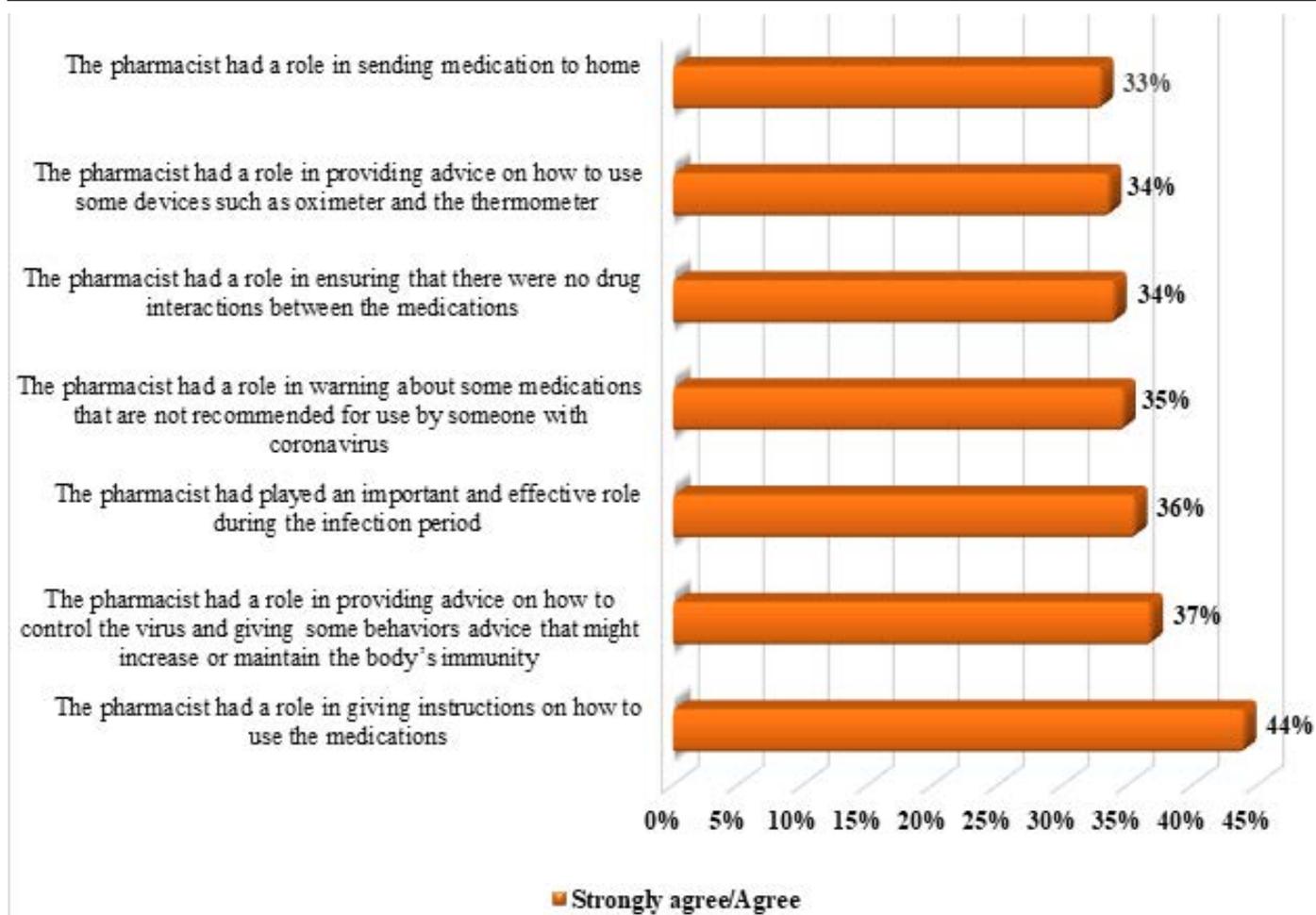


Figure 2. Participants' perceptions regarding the role of pharmacists' during COVID-19 infection.

that it was not bothersome nor painful.

Regarding the psychological state, 62.2% documented that their level of anxiety and stress increased during their infection.

Figure 1 shows how the participants ranked their commitment to the preventative measures before their infection; the mean of their commitment was 6.82 (SD=2.58) out of 10. More than one-third of the participants (37.0%) stated that their commitment to preventative measures such as wearing facial masks and gloves increased after getting infected.

Multiple logistic regression analysis of factors affecting COVID-19 infection severity among study participants highlighted that being older, female, smoker, having a chronic disease, all significantly affected the COVID-19 infection severity (Table 3).

Simple logistic regression highlighted that participant's age significantly affected the participant's need to visit a doctor, require hospital admission, use a ventilator, and the level of anxiety and stress during COVID-19 infection (Table 4).

Role of the pharmacist

When participants were asked how they contacted the

pharmacist in order to get their medications, almost half of the participants (48.5%) documented that they communicated the pharmacist through a third person, 21.4% visited the pharmacy personally, 16.0% stated they contacted the pharmacist over the phone, 3.1% documented that the pharmacist delivered the medications to their home, and 3.0% stated that the pharmacist they contacted was a family member. On the other hand, 8.0% did not contact any pharmacist during their infection.

Regarding the role of the pharmacist during participants' infection, all the statements were strongly agreed/agreed by more than one-third of the participants. The detailed information regarding the role of pharmacists during COVID-19 infection is demonstrated in Figure 2.

DISCUSSION

This cross-sectional study provides an overview of people who have been infected with COVID-19 in Syria and highlights the role of pharmacists during the infection.

In the current study, most of the participants were infected during July and August 2020, which is different from the WHO



Table 4. The influence of age on difference variables among study participants (n=576)

Parameter	OR	P-value [#]
Age	Need to visit a doctor [0: No, 1:Yes]	
	1.053	<0.001*
	Require a hospital admission [0: No, 1:Yes]	
	1.075	<0.001*
	Using a ventilator [0: No, 1:Yes]	
	1.129	<0.001*
	Using herbs during COVID-19 infection [0: No, 1:Yes]	
1.002	0.813	
Level of anxiety and stress [0: No, 1:Yes]		
1.017	0.011*	

#Using simple logistic regression, *Significant at 0.05 significance level.

data where the highest number of infected patients was recorded in December and March 2021.¹⁹ This is mainly due to the fact that this questionnaire represents participants who voluntarily responded and 70% of them are from the capital Damascus, reflecting a fraction of the population and not the whole country.

The most common symptoms that the majority of the infected people reported were fatigue, loss/change in smell and/or taste, and fever; which is consistent with the COVID-19 common symptoms reported by the WHO, which include fever, cough, tiredness, and loss of taste or smell.²⁰ Complete regaining of smell was reported in different studies to be within 3 to 4 weeks;²¹ in our study, about one-third reported regaining their sense within one week.

Various studies described the beneficial effects of vitamin C in the management of COVID-19,²²⁻²⁴ which has led to an increase in its consumption during the pandemic; for example, in this study more than half of the participants used it along with the pain relievers. Various herbs that are common in Syria were reported to be used by more than half the participants and the majority of those who used it reported improvement in their symptoms. Various traditional recipes gained popularity during the pandemic and many studies showed the potential of natural products in fighting viral infections.²⁵⁻²⁷

Due to the political situation and economic hardship in Syria, volunteering and community engagement became more active to help control COVID-19.²⁸ In this study, around 11.0% of the participants reported using these community services. Around 70.0% of the participants did not test for COVID-19, and this percentage was expected as it was reported that the tests in Syria are only available to people who expressed clear symptoms of the disease or were in direct contact with a confirmed case.⁶

More than half of the participants reported higher levels of anxiety and stress, which is consistent with what other patients felt as reported in previous studies.^{29,30}

In this study, older age, female sex, smoking, and suffering from a chronic disease were associated with higher severity of infection. Similar correlations were found in studies conducted in China,^{31,32} and a structured literature review of the risk factors affecting COVID-19 severity.³³

Regarding whom advised the participants to take the medications/nutritional supplements, pharmacists ranked second after doctors. Doctors played a major role in the participants' choice of medications and herbs, which was expected as doctors are at the frontline in fighting the pandemic.³⁴ In the current study, more than one-third of the participants strongly agreed/agreed that the pharmacist had played an important and effective role during the infection. Worldwide, during the pandemic, there was a greater dependence on community pharmacists as they were the first point of contact to fulfill the need of the public as they were one of the few places that stayed open during lockdowns.^{35,36} Globally, pharmacists have been given numerous opportunities and legal extensions of their role to fight COVID-19 and decrease the health burden on the country,^{36,37} for example, from the current study, 33.6% agreed that pharmacists had a role in providing advice on how to use some devices such as oximeter and the thermometer which were extensively used by individuals during the COVID-19 pandemic, moreover 33.0% agreed that pharmacist had a role in sending medications to homes during the pandemic.

Among the study limitations is the sampling approach, which depends on the accessibility of participants to internet-based services and their willingness to take part in online-based survey studies. Also, more than 70% of the study participants were from Damascus. Moreover, this study demonstrated peoples' commitment to COVID-19 preventive measures before getting infected; future studies would benefit from assessing the same commitment measures after being infected with the virus as well.

CONCLUSION

Increasing focus on patients' experience is a step towards better patient-centered care. Thus, patients' experiences should be highlighted more in the literature, especially during new outbreaks such as COVID-19 in order to manage the disease in an effective and appropriate way.

In Syria, patients' experiences during COVID-19 infection highlighted that contacting infected individuals was the most common way in which the disease was transmitted to the participants. Fatigue was the most common symptom reported by the participants. Vitamin C was the most used supplement, and many patients used herbs. More than half of the participants stated that their anxiety and stress levels increased after getting infected with COVID-19. Moreover, more than one-third of the participants strongly agreed/agreed that the pharmacist had played an important and effective role during the infection.



Patients infected with COVID-19 take over-the-counter medications and herbal products after symptoms appear during their infection. Pharmacists provide the patients with these medications; thus, they have a major role and are considered a vital pillar in patients' experience with the virus.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICTS OF INTEREST

The authors declare no relevant conflicts of interest or financial relationships.

AVAILABILITY OF DATA

Data available on request due to privacy/ethical restrictions.

CODE AVAILABILITY

Not applicable.

ETHICS APPROVAL

Ethical approval for this study was obtained from the Institutional Review Board Committee at the Faculty of Pharmacy, Applied Science Private University (Approval Number: 2021-PHA-34).

CONSENT TO PARTICIPATE

Informed consent of the participants was obtained prior to study inclusion.

CONSENT FOR PUBLICATION

Patients signed informed consent regarding publishing their data.

References

1. The World Health Organization. Coronavirus disease (COVID-19) pandemic. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
2. The World Health Organization. 2019-nCoV outbreak is an emergency of international concern. 2020. Available from: <https://www.euro.who.int/en/health-topics/health-emergencies/international-health-regulations/news/news/2020/2/2019-ncov-outbreak-is-an-emergency-of-international-concern>
3. Yang Y, Peng F, Wang R, et al. The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *J Autoimmun.* 2020;109:102434. <https://doi.org/10.1016/j.jaut.2020.102434>
4. Visacri MB, Figueiredo IV, Lima T de M. Role of pharmacist during the COVID-19 pandemic: A scoping review. *Res Soc Adm Pharm.* 2021;17(1):1799-806. <https://doi.org/10.1016/j.sapharm.2020.07.003>
5. Abbara A, Rayes D, Fahham O, et al. Coronavirus 2019 and health systems affected by protracted conflict: The case of Syria. *Int J Infect Dis.* 2020;96:192-5. <https://doi.org/10.1016/j.ijid.2020.05.003>
6. Al ahdab S. A cross-sectional survey of knowledge, attitude and practice (KAP) towards COVID-19 pandemic among the Syrian residents. *BMC Public Health.* 2021;21(1):296. <https://doi.org/10.1186/s12889-021-10353-3>
7. Syrian Ministry of Health. Available from: <https://www.moh.gov.sy/Default.aspx?tabid=246&language=en-US>. [Accessed: 30October 2021].
8. COVID-19 live - Coronavirus statistics - worldometer. Available from: <https://www.worldometers.info/coronavirus/>
9. Al-tameemi K, Khudur H, Dayoob H, et al. SARS-COV-2 pandemic in Syria: symptoms and treatments. *Br J Med Heal Res.* 2021.
10. Centers for Disease Control and Prevention. COVID-19. How to protect yourself and others. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>. [Accessed: 15August 2021].
11. Hedima EW, Adeyemi MS, Ikunaiye NY. Community pharmacists: on the frontline of health service against COVID-19 in LMICs. *Res Soc Adm Pharm.* 2020;17(1):1964-6. <https://doi.org/10.1016/j.sapharm.2020.04.013>
12. Kretchy IA, Asiedu-danso M, Kretchy J. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. *Res Soc Adm Pharm.* 2020;17(1):2023-6. <https://doi.org/10.1016/j.sapharm.2020.04.007>
13. Song Z, Hu Y, Zheng S, et al. Hospital pharmacists' pharmaceutical care for hospitalized patients with COVID-19: recommendations and guidance from clinical experience. *Res Soc Adm Pharm.* 2021;17(1):2027-31. <https://doi.org/doi:10.1016/j.sapharm.2020.03.027>
14. FIP. COVID-19: guidelines for pharmacists and the pharmacy workforce. 2020. Available from: <https://www.fip.org/files/content/priority-areas/coronavirus/COVID-19-Guidelines-for-pharmacists-and-the-pharmacy-workforce.pdf>. [Accessed: 9July 2021].
15. Saeed BQ, Al-Shahrabi R, Alhaj SS, et al. Side effects and perceptions following Sinopharm COVID-19 vaccination. *Int J Infect Dis.* 2021;111:219-226. <https://doi.org/10.1016/j.ijid.2021.08.013>
16. El-Shitany NA, Harakeh S, Badr-Eldin SM, et al. Minor to moderate side effects of Pfizer-Biontech COVID-19 vaccine among Saudi residents: A retrospective cross-sectional study. *Int J Gen Med.* 2021;14:1389-401. <https://doi.org/10.2147/IJGM.S310497>



17. Eng J. Sample size estimation: how many individuals should be studied? *Radiology*. 2003;227(2):309-13.
18. Asan U, Soyer A. Failure mode and effects analysis under uncertainty: a literature review and tutorial. *Intelligent Systems Reference Library*. 2016;97:265-325.
19. The World Health Organization. Syrian Arab Republic Situation 2021. Available from: <https://covid19.who.int/region/emro/country/sy>
20. The World Health Organization. Coronavirus disease (COVID-19). Available from: https://www.who.int/health-topics/coronavirus#tab=tab_3
21. Iannuzzi L, Salzo AE, Angarano G, et al. Gaining back what is lost: recovering the sense of smell in mild to moderate patients after COVID-19. *Chem Senses*. 2020;45(9):875-81. <https://doi.org/10.1093/chemse/bjaa066>
22. Carr AC, Rowe S. The emerging role of vitamin C in the prevention and treatment of COVID-19. *MDPI*. 2020;12(11):3286. <https://doi.org/10.3390/nu12113286>
23. Abobaker A, Alzwi A, Alraied AHA. Overview of the possible role of vitamin C in management of COVID-19. *Pharmacol Reports*. 2020;72(6):1517-28. <https://doi.org/10.1007/s43440-020-00176-1>
24. Hemilä H, Man AME de. Vitamin C and infections. *Front Med*. 2020.
25. Antonio ADS, Wiedemann LSM, Veiga-Junior VF. Natural products' role against COVID-19. *RSC Adv*. 2020;10:23379-93.
26. Huang J, Tao G, Liu J, et al. Current prevention of COVID-19: natural products and herbal medicine. *Front Pharmacol*. 2020;11:588508. <https://doi.org/10.3389/fphar.2020.588508>
27. Boozari M, Hosseinzadeh H. Natural products for COVID-19 prevention and treatment regarding to previous coronavirus infections and novel studies. *Phyther Res*. 2020;35(2):864-76. <https://doi.org/10.1002/ptr.6873>
28. Ekzayez A, Al-Khalil M, Jasiem M, et al. COVID-19 response in northwest Syria: innovation and community engagement in a complex conflict. *J Public Health (Bangkok)*. 2020;42(3):504-9. <https://doi.org/10.1093/pubmed/fdaa068>
29. Zandifar A, Badrfam R, Yazdani S, et al. Prevalence and severity of depression, anxiety, stress and perceived stress in hospitalized patients with COVID-19. *J Diabetes Metab Disord*. 2020;19(2):1431-8. <https://doi.org/10.1007/s40200-020-00667-1>
30. Mazza MG, De Lorenzo R, Conte C, et al. Anxiety and depression in COVID-19 survivors: Role of inflammatory and clinical predictors. *Brain Behav Immun*. 2020;89:594-600. <https://doi.org/10.1016/j.bbi.2020.07.037>
31. Shang W, Dong J, Ren Y, et al. The value of clinical parameters in predicting the severity of COVID-19. *J Med Virol*. 2020;92(10):2188-92. <https://doi.org/10.1002/jmv.26031>
32. Li L, Sun W, Han M, et al. A study on the predictors of disease severity of COVID-19. *Med Sci Monit*. 2020;26:e927167. <https://doi.org/10.12659/MSM.927167>
33. Wolff D, Nee S, Hickey NS, et al. Risk factors for Covid-19 severity and fatality: a structured literature review. *Infection*. 2021;49(1):15-28. <https://doi.org/10.1007/s15010-020-01509-1>
34. Misra A. Doctors and healthcare workers at frontline of COVID 19 epidemic: Admiration, a pat on the back, and need for extreme caution. *Diabetes Metab Syndr Clin Res Rev*. 2020;14(3):255-6. <https://doi.org/10.1016/j.dsx.2020.03.006>
35. Bukhari N, Rasheed H, Nayyar B, et al. Pharmacists at the frontline beating the COVID-19 pandemic. *J Pharm Policy Pract*. 2020;13:8. <https://doi.org/10.1186/s40545-020-00210-w>
36. Merks P, Jakubowska M, Drelich E, et al. The legal extension of the role of pharmacists in light of the COVID-19 global pandemic. *Res Soc Adm Pharm*. 2021;17(1):1807-12. <https://doi.org/10.1016/j.sapharm.2020.05.033>
37. Basheti IA, El-hajji F, Nassar R, et al. Pharmacists' awareness of COVID-19 and perceptions of their roles, barriers, and roles of policymakers: Exploring the Middle East and North Africa (MENA). *Int J Clin Pract*. 2021;75(6):1-11. <https://doi.org/10.1111/ijcp.14074>