



Self-care interventions among the Jordanians during the COVID-19 lockdown: A cross-sectional study of community pharmacists' observations

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ABSTRACT

The COVID-19 pandemic demanded that many governments implement a comprehensive lockdown to control the spread of the disease. Several people sought self-care intervention practices to cope with this threat due to the lack of approved treatments or vaccines in the first year of the pandemic. Because hospitals and clinics were closed, community pharmacists were the first-line healthcare providers and reliable information sources. This study explores self-care measures among Jordanians during the repeated COVID-19 lockdowns. This study was conducted employing a self-administered online survey distributed to community pharmacies and medical representatives in various provinces of Jordan during the intermittent lockdown periods of the pandemic. According to the responses received from 138 participants, the elderly, chronic disease patients, and parents of young children were the major groups interested in purchasing self-care measures. Self-care measures included gloves, masks, alcohol-based disinfectants, and dietary supplements, with limited queries regarding antivirals and antimalarial drugs. The most reported sales regarding dietary supplements were vitamins B, C, and D, zinc, multivitamins, and many inquiries regarding herbs, mostly anise, lemon, garlic, ginger honey, and turmeric. In general, a decrease in sales was observed by most of the responding participants. Moreover, participants adhere to the continuous information published by the official health authorities. As frontline healthcare practitioners, community pharmacies need appropriate and mandatory training and continuous education to continue providing vital services in future pandemics.

INTRODUCTION

The COVID-19 virus was first detected in animals and then transmitted to humans in 2019 in Wuhan, China. According to the World Health Organization (WHO), the reported deaths reached more than 6 million and a half, with 651 million confirmed cases due to COVID-19 in over 180 countries (COVID-19, WHO). There is currently no cure for COVID-19 infection, although many therapies are being investigated to treat

COVID-19; however, vaccination programs were applied in the second year of the pandemic (Alinia-Ahandani and Sheydaei, 2020), including antivirals such as remdesivir and ivermectin and immunomodulatory agents such as corticosteroids. Several medications, including antivirals like ritonavir/lopinavir and antimalarials like hydroxychloroquine, had been tried and discontinued. Remdesivir is currently the only antiviral agent approved by the Food and Drug Administration (FDA) for COVID-19, but only in some cases (Aslan and Akova, 2021). Moreover, suggested preventive methods against COVID-19 were created based on overcoming the manner of transmissions and include frequent hand washing, maintaining physical separation, disinfections, quarantine, avoiding face contact with dirty hands, and wearing a mask advised, especially for suspects and those caring for them (Girum *et al.*, 2020).

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The first case in Jordan was reported on March 2, 2020, and 15 days later, Jordan entered a comprehensive lockdown period (corona.moh.gov.jo). The lack of treatment or a vaccine at the time of the study prompted many people to consider new interventions to protect the health and safety of themselves and their families. It is well-established that chronic diseases, including hypertension, cancer, asthma, chronic obstructive pulmonary disease (COPD), and diabetes, are among the top comorbidities with COVID-19 (Fekadu *et al.*, 2021). The pandemic's spread was a great challenge to the healthcare system in Jordan and worldwide. Therefore, the International Pharmaceutical Federation declares new guidelines for pharmacists' new roles throughout the pandemic, besides their traditional role of patient counseling and regular medication supply and dispensing (fip.org). Community pharmacists were the first healthcare providers to meet and answer the patients' questions about COVID-19 treatment, educate patients about the spread and prevention of the coronavirus infection, provide medications for home delivery, and perform routine tasks such as refilling the patients' prescriptions, detecting and referring early suspected cases of COVID-19, and playing a latent role in vaccinating the patients (fip.org, Pinto *et al.*, 2021).

Almost half of the world's population lacked access to the required healthcare; consequently, the WHO recommended self-care interventions (including counseling and medications) in the areas of disease prevention and self-medication to enable governments and communities to control the spread of the virus and promote health, with or without the support of health professionals for nearly half of the world's population (WHO.int-self-care). In the pandemic curfews and lockdowns, pharmacists in community pharmacies and drug stores played a crucial role in the continuous supply of over-the-counter, chronic diseases, and COVID-19-related medications. Since they are knowledgeable about medications, they made significant contributions to financially and regionally marginalized communities (Hess *et al.*, 2022; Strand *et al.*, 2020). At the beginning of the COVID-19 pandemic, people were terrified of the rapidly spreading disease and the lack of vaccines to prevent or drugs to treat that virus infection worldwide. Therefore, people in different countries searched for alternative modalities for prevention and an attempt to treat COVID-19 disease. Community pharmacists played a crucial role in self-care interventions used by patients at the beginning of the pandemic (Cadogan and Hughes, 2021). One of the vital alternatives was dietary (nutritional) supplements that include herbs, vitamins, and minerals as potential substitutes to strengthen the immune system and decrease the risk of acquiring the COVID-19 infection (Elayeh *et al.*, 2021; Jalil *et al.*, 2020; Younis *et al.*, 2021).

In Jordan, during the first 3 weeks of February 2020, a general lockdown was applied with limited access to community pharmacies and hospitals due to the COVID-19 pandemic. During the lockdown periods, Jordan's primary care, specialized clinics, and health institutions were closed as a preventive measure for COVID-19. People were turning to community pharmacies to search for and ask about complementary alternatives that help them prevent COVID-19. As a result of limited access to hospitals and closed clinics, pharmacists were driven to meet the public needs by answering their queries about supplying self-protection demands. A limited number of studies explore public practices during the pandemic, for example, from a nutrition and diet perspective (Alhaj *et al.*, 2021). Only a few published studies were found to

explore the pharmacist's perspective on the pandemic itself (Al-Daghastani *et al.*, 2021). However, no published studies in Jordan were found evaluating the detailed pharmacists' observations of self-care measures adopted by the public during the lockdowns (Abdel Jalil *et al.*, 2020). Consequently, this study aims to explore the self-care interventions used by Jordanians to prevent or treat COVID-19 symptoms during the early applied lockdowns, based on the observations of community pharmacists and pharmacists working in drug stores, and to explore how community pharmacies sales of self-care medications and products have been affected by the COVID-19 lockdown. The information provided will assist decision-makers in dealing with future emergency health challenges since disease prevention could sustain health systems.

METHODOLOGY

Study design and data collection

This study is a cross-sectional study conducted during the repeated lockdowns in Jordan between February 2020 and October 2020. Key pharmaceutical sectors working within the pharmaceutical supply chain system, i.e., community pharmacies and medical representatives of drug stores in Jordan, were invited to participate in the study. Only registered pharmaceutical personnel (pharmacists) working within and conversant with Jordan's pharmaceutical supply chain system were included in the study. The questionnaire was designed by a group of academic staff members from the School of Medicine, Al-Balqa Applied University, and the Faculty of Pharmaceutical Sciences, Hashemite University, Zarqa, Jordan. A separate panel of pharmacology and pharmacoeconomics experts reviewed the questionnaire draft and recommended modifications. Furthermore, a web-based pilot study was conducted (15 community pharmacists and medical representatives) on the most prescribed self-care products and medications during COVID-19 lockdowns, in addition to evaluating the questionnaire design and length and the questions' clarity and appropriateness to reflect the current study objectives. The responses received from the pilot study were utilized to develop the final questionnaire but were not used for the final data analysis. We used the link to the final questionnaire form to invite pharmacists to participate in the current study using pharmacists' Facebook and WhatsApp-restricted groups. A brief introduction on the first page of the questionnaire to inform the participants includes the following: the study aims to explore their observations of self-care interventions through the lockdowns, data used for scientific research purposes, a statement that confirms the confidentiality of the study results, and the time required to complete the questionnaire. A self-administered questionnaire was developed in English and translated into Arabic (Jordan's mother tongue). It consisted of 25 closed-ended questions and multiple-choice questions generated using Microsoft Forms[®]. This survey is divided into four sections: the first part contains the participants' demographic data questions, such as gender, age, community pharmacy location, and educational level; in the second part, participants were asked general questions about the pandemic, available medications, and new findings regarding COVID-19 treatment and prevention; the third part contains specific questions regarding the sales of self-care interventions during partial lockdowns; the fourth part contains questions regarding the sources of information and training courses participants attended. Figure 1 illustrates a schematic representation of the various stages of the study.

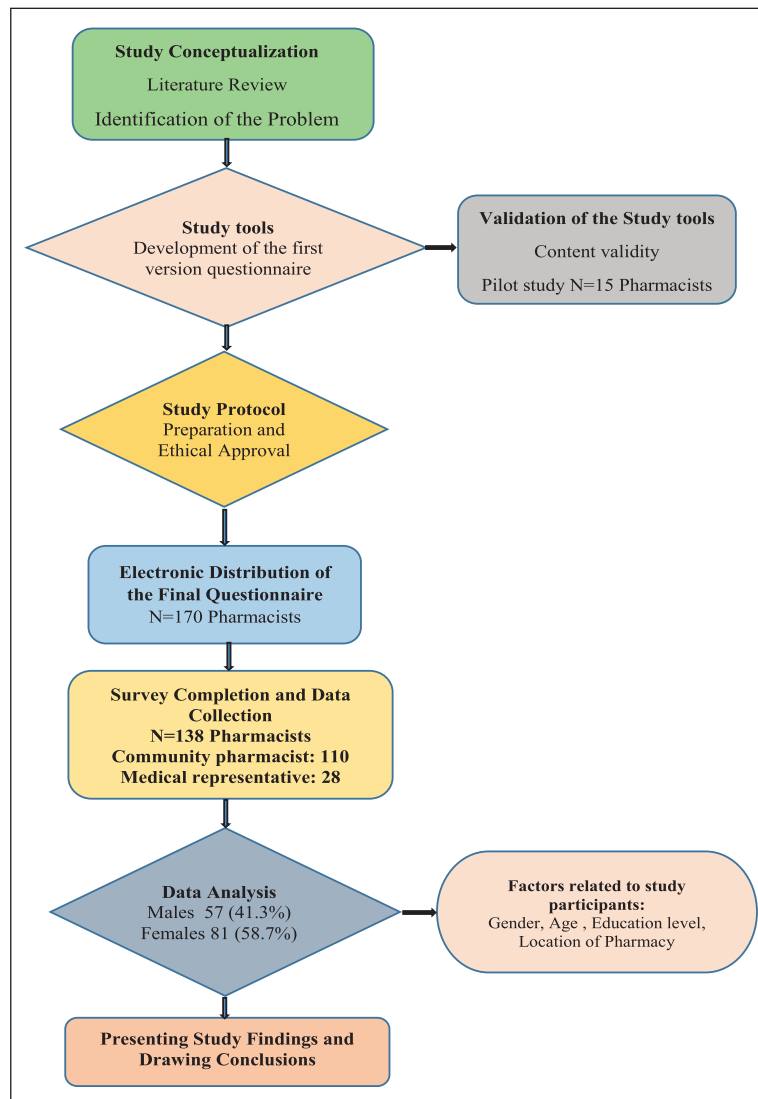


Figure 1. Schematic diagram of the different stages of the study.

Sample size calculation

According to estimates from the Jordan Pharmacists Association, 7,300 licensed pharmacists are working in community pharmacies. With a margin of error of 10%, a confidence level of 95%, and a response probability of 0.5, 95 pharmacists were calculated (Raosoft, 2022), implying that 100 participants were intended. A questionnaire was distributed to 170 community pharmacies/drug stores, of which 138 completed it.

Data analysis

Statistical analysis was conducted using a Statistical Package for the Social Sciences (SPSS Inc., Chicago) version 24.0. Data cleaning, validation, and coding were performed before analysis. All study-generated data were presented as frequency percentages. Comparisons were performed using Student's *t*-test for continuous variables and Pearson's chi-square test for categorical variables. The level of significance was set at $p < 0.05$.

RESULTS

Sociodemographic characteristics of participants

Data were analyzed from 138 respondents who completed the survey. The sociodemographic analysis showed that more than half of the participants were males (58.7%), while the rest were females (41.3%), as illustrated in Table 1. In addition, more than one-third (38.2%) were between the ages of 25 and 34 years, followed by the age groups 35–44 years (25.5%) and 45–55 years (22.7%). Interestingly, most respondents have a bachelor's degree (91.3%), compared to the postgraduates (8.7%). Table 1 also shows that community pharmacists constituted 71.7% of the studied population, while the rest were medical representatives (28.3%). Approximately half of the participants were from the capital city Amman (42.7%), followed by workers in the southern region (26.4%). In comparison, the proportions of participants from the central and northern regions were 16.4% and 14.5%, respectively.

Table 1. Sociodemographic details of pharmacist participants (N = 138).

Parameter	N (%)
Gender	
Female	57 (41.3%)
Male	81 (58.7%)
Age in years	
20–24	11 (10%)
25–34	42 (38.2%)
35–44	28 (25.5%)
45–55	25 (22.7%)
≥55	4 (3.6%)
Education level	
Bachelor	126 (91.3%)
Postgraduate	12 (8.7%)
Pharmaceutical sector	
Community pharmacy	99 (71.7%)
Medical representative	39 (28.3%)
Location of the pharmacy	
Amman	47 (42.7%)
Central area	18 (16.4%)
North area	16 (14.5%)
South area	29 (26.4%)

Study participants' considerations about clients' health status and safety measures during the lockdown

According to the study results, more than half of the participants (56.4%) noticed that their clients adhered to the public safety measures when entering their working locations during the lockdown period. These measures include wearing masks and physical distancing inside working areas (at least 6 feet of distance between people). More than half of the participants (57.3%) affirmed that a history of chronic diseases was the main attribute in increased interest in self-care interventions during the lockdown period. The largest group that showed this interest was the diabetic patients, followed by parents of pediatric patients, geriatric patients, and hypertensive patients (55.5%, 50.9%, 37.3%, and 30%, respectively). Interestingly, patients suffering from lung diseases, including bronchial asthma, and other pulmonary diseases, like COPD, pneumonia, and pulmonary fibrosis, were 22.7% and 21.8%, respectively, as depicted in [Figure 2A](#).

In addition, more than two-thirds of the participants (75.5%) confirmed that their clients follow up on the news about new treatments and preventive measures for COVID-19.

Sales of self-care measures during the repeated lockdown

Most participants (94.2%) generally affirmed that they noticed a marked decrease in general sales during the repeated lockdowns. However, the most sold items of the self-care intervention were gloves and masks, as reported by 43.20% of the participants, followed by disinfectant solutions

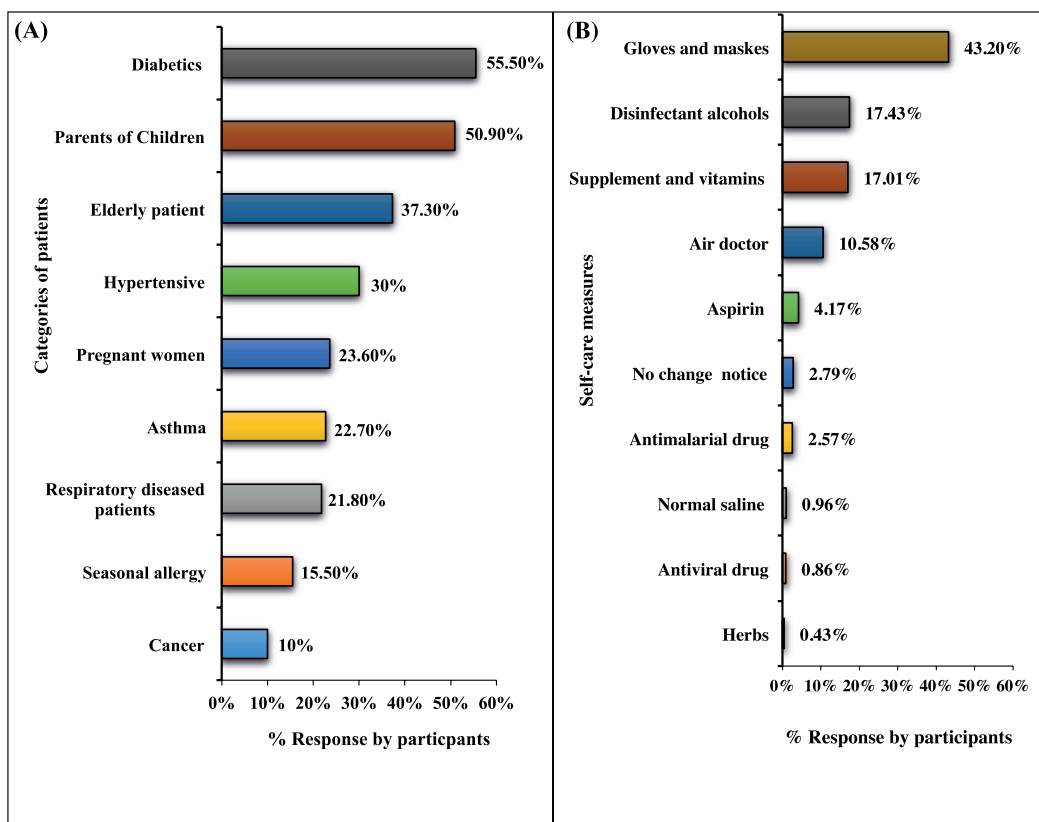


Figure 2. (A) Categories of patients interested in self-care interventions according to participants' responses. (B) General categories of most sold items during the lockdown period of the COVID-19 pandemic.

like alcohol and others (17.43%), and dietary supplements demanded items (17.01%), as shown in Figure 2B. Similarly, there was a noticeable interest in purchasing preventive items, like Air Doctor[®] (a Japanese technology hung on the chest with sanitizing effect) used as a preventive measure, aspirin, and antimalarials (10.58%, 4.17%, and 2.57%, respectively). At the same time, the least sold items concerning COVID-19 prevention or treatments were herbs, antiviral drugs, and normal saline (0.43%, 0.86%, and 0.96%, respectively). It should be pointed out that an increase in ordering dietary supplements was reported by 61.6% of the participants, compared to those who observed a decrease or no change in the percentage of demand for nutritional supplements (23.9% and 14.5%, respectively).

Additionally, around two-thirds of respondents (65.9%) found it easy to supply self-care measures to citizens during the lockdown, compared to 34.1% who found difficulty in their services.

Patients' choices regarding dietary supplements as a self-care intervention during the repeated lockdowns

The study results also revealed that more than two-thirds of the study participants (72.5%) confirmed that they had answered inquiries about preventing and treating COVID-19 regarding using masks, disinfectants, and nutritional supplements. Additionally, dietary supplements most sold were vitamin C, zinc, vitamin D, and multivitamin preparations (38.76%, 19.78%, 11.27%, and 11.10%, respectively).

11.27%, and 11.10%, respectively), as shown in Figure 3. The least demanded supplements were calcium, ginseng, cod liver oil, and magnesium, with percentages of 0.80%, 0.96%, 0.96%, and 1.96%, respectively. In addition, the most requested herbal preparations bought, ordered, or questioned about were anise, lemon, honey, and ginger (52.7%, 36.4%, 35.5%, and 32.7%). On the other hand, the least sold herbal preparations ordered or questioned were raw nuts, cumin, fenugreek, and cloves (3.6%, 3.6%, 4.5%, and 5.5%, respectively).

More than half of the study participants (52.7%) confirmed a preference to purchase dietary supplements from international brands compared to local ones (42.7%). Interestingly, 50.00% of the study participants verified an increased interest among healthcare workers and doctors when inquiring about or buying nutritional supplements.

Source of information about the study participants about COVID-19 and continuous education and training during the lockdown

Most of the respondents reported that the information published by the governmental sector [Ministry of Health (MOH) and the Jordan FDA (JFDA)] (64.50%) was the primary source of information regarding COVID-19, followed by lower percentages for WHO bulletins (48.20%), newspapers and self-education (41.80%), and Jordan Pharmacists Association (24.50%) as shown in Figure 4. The last source of information selected by the participants was social media and colleagues (12.7%).

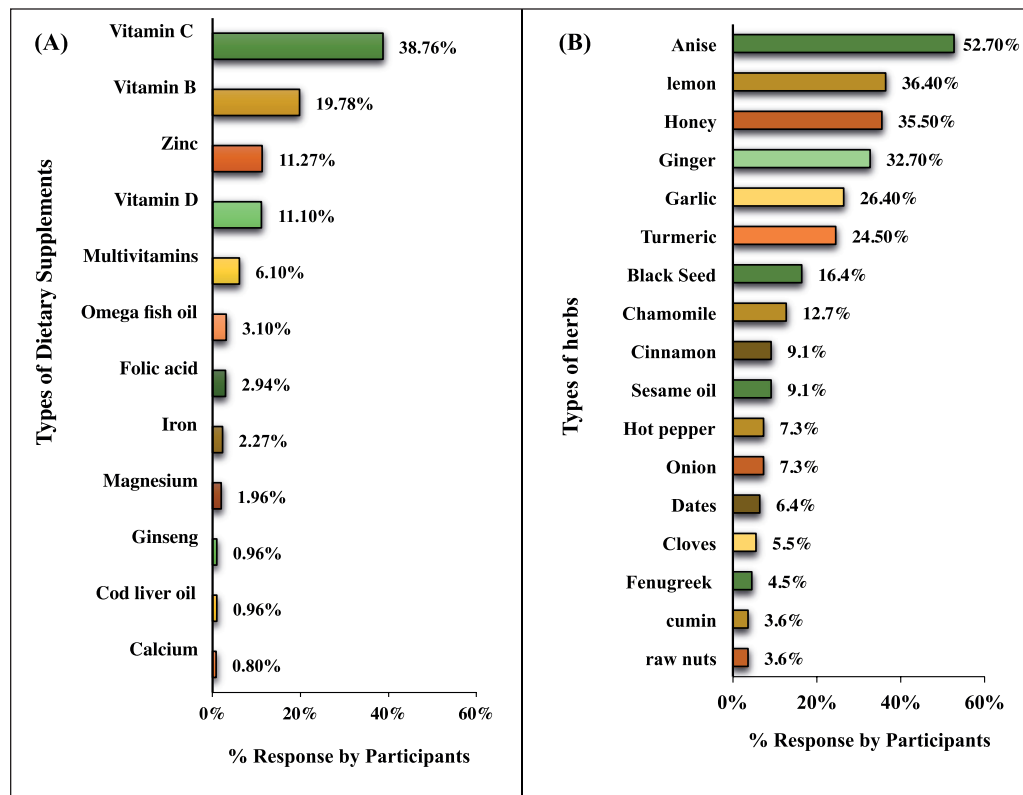


Figure 3. (A) Types of dietary supplements that the customers most purchased during the lockdown periods of the COVID-19 pandemic. (B) The herbal preparations customers bought ordered or asked about their usefulness during the lockdown periods to prevent the COVID-19 virus.

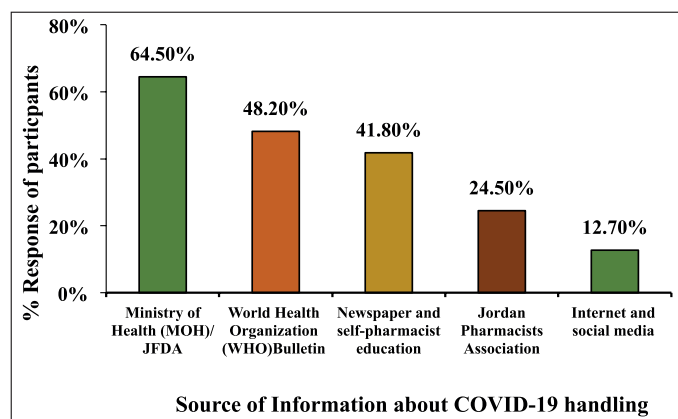


Figure 4. The source of information about COVID-19 used in sales and counseling patients to prevent the virus.

Regarding attending training workshops on COVID-19 prevention and treatment, more than half of the participants (62.3%) did not attend any awareness workshops specialized in dealing with patients' inquiries related to the pandemic, compared to 16.7% who attended only one workshop. Among those who attended two workshops, 44.9% of the participants reported attending the workshop in person, compared to 55.1% of those who attended remote workshops. Among the attendees, 21.0% attended more than five workshops.

Table 2 shows a significant difference ($p < 0.05$) in relation to participants' gender about inquiries related to dietary supplements and vitamins, which were noted by male participants more than females. On the other hand, the age group of 24–35 years of the participants reported an increase in purchase or interest in the issue of dietary supplements and vitamins during the lockdown periods for economic reasons. Interestingly, pharmacists with bachelor's degrees have noticed increased questions about antimalarial and antiviral drugs as a treatment or preventive measure for the COVID-19 virus.

DISCUSSION

This study was designed to explore pharmacists' experience during the repeated lockdowns in Jordan regarding public self-care practices in response to COVID-19 infection. Despite the low infection rates in pediatrics and adolescents, half of the participants (50.9%) reported that children's parents sought self-care interventions for their children. The infection of COVID-19 in children has shown a range of manifestations ranging from asymptomatic, mild respiratory tract symptoms to severe pneumonia with acute respiratory distress syndrome up to severe pneumonia in susceptible patients or those with underlying diseases (Malcangi *et al.*, 2022). However, based on JFDA bulletins, Jordan's pediatric population is prone to allergy-related illnesses, so parents may be concerned about COVID-19 prevention (Al-Iede *et al.*, 2021).

By the end of the first month of the lockdown (March 17, 2020, till April 16, 2020), pharmacies in Jordan reported a drop in general sales similar to reported sales in many countries worldwide, which can be attributed to the decreased working hours after the brief allowances and shortages of drug supplies due to

discontinued drug import (Romano *et al.*, 2021). Since the WHO announced that the main route of the viral infection was through direct skin contact and respiratory droplets (during coughing, talking, or sneezing), it was evident that using gloves and masks was the primary method adopted for personal protection within the public (Hemmer *et al.*, 2021). Consequently, an increase in the sales of self-care products (gloves, masks, and Air Doctor[®]) related to COVID-19 prevention was reported in the current study. As affirmed by the study participants, the public fulfillment of restrictions enforced by the local government, including physical distancing through floor markings and wearing masks and gloves, was very high. On the other hand, disposable gloves (both nitrile medical gloves and latex with powder and powder-free) were also reported to be used by customers during the pandemic despite the absence of conclusive evidence of their benefits; however, they were recommended for healthcare professionals (Khubchandani *et al.*, 2020; Schobere *et al.*, 2022). Similarly, hand sanitizers were the second most reported sales of self-care measures since the WHO guideline recommended them to minimize disease transmission, which has been reported to reduce the burden on healthcare providers (Prajapati *et al.*, 2022).

The widespread use of dietary supplements for preventing and treating COVID-19 was mainly guided by social media, with a marginal role for healthcare practitioners (Radwan *et al.*, 2022). The US FDA did not authorize using any dietary supplement to prevent or manage COVID-19. In the present study, the most reported sales regarding dietary supplements were vitamins C, B, and D, zinc, and multivitamins. Before the pandemic's spread, vitamin C was a typical alleviating therapy in respiratory tract infections (bacterial and viral origin) in Jordan. It has been proposed that vitamin C has immune-modulatory mechanisms that can help to alleviate or reduce COVID-19 symptoms, thus preventing worsening internal vascular endothelial injury (Ahmad, 2022). On the other hand, the increased use of vitamin B by pharmacy customers can be attributed to its role in the activation of innate and adaptive immune responses against COVID-19 through improving lung functions, protecting endothelial lining, preventing thrombosis, and reducing the length of hospital stay as reported in similar studies (Babar *et al.*, 2021; Shakoor *et al.*, 2021).

Similarly, the increased interest and use of zinc-containing supplements described by study participants can be explained by their ability to prevent the growth of coronavirus in cells grown in the lab by inhibiting RNA polymerase activity, which has also been investigated (te Velthuis *et al.*, 2010). Zinc was proposed to help in the pathogenesis of COVID-19 infection due to its immune response modulation and anti-inflammatory properties, thus enhancing the recovery of patients with severe pneumonia. On the other hand, despite the elevated queries or sales regarding vitamin D during the lockdown, vitamin D supplementation was not associated with reducing the risk of all causes of acute respiratory tract infection or COVID-19 (Jolliffe *et al.*, 2022). The reported use of folic acid in this study as a therapeutic agent to treat COVID-19 can be explained by its role in DNA and protein synthesis and, to a lesser extent, the adaptive immune response (Shakoor *et al.*, 2021).

Other dietary supplements chosen by the Jordanians were similar to those previously published studies; these include

Table 2. Association between sociodemographic characteristics and participants' observation regarding public concerns about self-care measures during the COVID-19 pandemic (N = 138).

Observation	p value			
	Age	Gender	Workplace location	Academic degree
Compliance public with safety instructions during the lockdown period	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Increasing queries about dietary supplements and vitamins during the lockdown period	$p > 0.05$	$p < 0.05^*$	$p > 0.05$	$p > 0.05$
Increase in sales of dietary supplements and vitamins during the lockdown period	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
The ease of providing dietary supplements and vitamins during the lockdown period	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Increased demands for dietary supplements and vitamins during the lockdown period for economic reasons	$p < 0.05^*$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Increase in citizens' inquiries about discovering drugs to treat COVID-19 disease during the lockdown	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Increase in citizens' inquiries about antimalarial drugs and antivirals drugs to treat COVID-19 disease during the lockdown	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p < 0.05^*$
Increase in requests for more international than local brands of nutritional supplements and vitamins during the lockdown periods	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Increase in inquiries about specific brands mentioned on social media about nutritional supplements and vitamins during the lockdown periods	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Attendance of awareness-raising workshops on COVID-19 disease during the lockdown periods	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$
Attendance of awareness workshops for responding to patients' inquiries about the COVID-19 pandemic during the lockdown periods	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$

* Statistically significant at $p < 0.05$.

iron (Bastin *et al.*, 2022), magnesium (Trapani *et al.*, 2022), cod live oil (Brunvoll *et al.*, 2022), ginseng (Yi, 2022), and calcium (Crespi and Alcock, 2020). Fadiyah *et al.* (2022) reviewed the data from several studies showing that omega-3 plays a significant role in COVID-19 prevention, management, and treatment. In infected patients, omega-3 increased the survival rate in COVID-19 patients by reducing the duration of symptoms, with a potential role in overcoming renal and respiratory dysfunction (Doaei *et al.*, 2021).

Similarly, study participants reported an increased interest in some prescribed medications that were associated with COVID-19 disease. For example, the choice of aspirin as a self-care intervention can be explained by the high incidences of venous thromboembolism and pulmonary embolism reported in diagnosed COVID-19 cases. Aspirin has been reported to significantly decrease mortality risk by 32% at 14 and 30 days after COVID-19 infection (Zareef *et al.*, 2022). Likewise, acyclovir, an oral antiviral, was proposed as an adjuvant therapy since an acyclovir derivative was evaluated to form a stable complex with coronavirus (Heidary *et al.*, 2021). However, according to JFDA instructions to the pharmacies during the pandemic, direct purchasing of acyclovir from pharmacies was prohibited as a strategy to enable tracking and control the spread of the infection. The participants also reported a low interest of the public (2.57%) in hydroxychloroquine (an antimalarial drug), which initially received emergency authorization from the US FDA for use against the virus. However, this authorization was later revoked due to nonsuccessful results in randomized controlled trials (fda.gov).

Likewise, nasal and mouth rinses were proposed by Jordanians, as observed in this study, since COVID-19 spreads by contact and respiratory droplets. In Jordan, normal saline (0.9% sodium chloride) is available as an over-the-counter medication

in plastic bags or as sprays, nasal drops, and so forth. However, reports have demonstrated a higher efficacy of hypertonic solution (with a concentration of less than 5% sodium chloride) than regular saline rinses. The higher osmolarity of hypertonic solutions pulls water out of cells, resulting in enhanced hydration of the aqueous portion of the mucosal lining, followed by increased calcium efflux from nasal epithelial cells, improving mucociliary clearance and reducing epithelial edema (Farrell *et al.*, 2020).

Similar to previous studies in Jordan, herbal medicine is considered a traditional remedy for various ailments (Al-Daghistani *et al.*, 2021; Al-Hamaideh *et al.*, 2017, 2020; Jaber *et al.*, 2020). According to the study participants, many queries were received regarding herbs like anise, lemon, honey, and ginger. The following paragraphs discuss the most inquired herbs concerning their antiviral properties and the reported literature regarding their investigation in COVID-19 prevention and treatment. The most reported herbal remedy by the participants was star anise (*Illicium verum*) which contains shikimic acid. This intermediate is used to manufacture oseltamivir (Tamiflu®), an antiviral influenza A and B medication. Moreover, molecular docking studies demonstrated that the star anise phytoconstituents, verimol G is considered a potential COVID-19 antiviral that inhibits Mpro, the main protease of the virus (Singh *et al.*, 2021). Likewise, lemon (*Citrus limon*, family Rutaceae) is a commonly used remedy in colds and respiratory infections due to its antioxidant and anti-inflammatory properties (Thota *et al.*, 2020). In a survey-based study involving more than 2,000 Jordanians in 2021, lemon consumption before infection was associated with a lower incidence of severe COVID-19 and hospitalization (Nimer *et al.*, 2022). Studies investigating the effectiveness of lemon in COVID-19 have proposed that lemon oils (citronellol and geranium oil) displayed significant ACE2 inhibitory effects through significant downregulation of angiotensin-converting

enzyme 2 (ACE2) expression in epithelial cells that affect ACE2 (Senthil Kumar *et al.*, 2020).

To a lesser extent, Jordanians choose other herbal remedies that have been reported to have immune-supportive properties or have been investigated later on for their effectiveness in COVID-19, like chamomile (Moghaddam *et al.*, 2021), cinnamon (Yakhchali *et al.*, 2021), sesame oil (Allam *et al.*, 2021), hot pepper (Gharaibeh *et al.*, 2020; Sen *et al.*, 2022), onion (Dorsch and Ring, 2020), and fenugreek and cumin (Sen *et al.*, 2022). Interestingly, honey was reported as one of the self-interventions according to 35.50% of participants. Honey's antioxidant and anti-inflammatory properties helped prevent lung, renal, and cardiovascular damage in COVID-19 infections (Rao *et al.*, 2016). Two mechanisms were postulated for this action: the increased serum levels of interferon-gamma, which plays a significant role in the control of COVID-19 infection, and the substantial binding affinity to the main protease (Mpro) necessary for the virus replication (Abedi *et al.*, 2021).

Garlic (*Allium sativum*) is a common plant in Jordan, with combined antiviral and immune system function-preserving properties, as observed in patients with COVID-19 infection (Sharanya *et al.*, 2021). According to published studies, garlic prevents COVID-19 infection by enhancing immune system cells and suppressing the generation and secretion of proinflammatory cytokines and the proinflammatory hormone leptin, which is obtained from adipose tissue (Donma and Donma, 2020). On the other hand, ginger (*Zingiber officinale*) is available as dry and fresh rhizome in Jordan with antioxidant, antiviral, antibacterial, and antidiabetic properties (Jafarzadeh *et al.*, 2021). Studies conducted in Saudi Arabia revealed that ginger users had a lower percentage of COVID-19 hospitalization compared to nonusers (28.0% and 38.0%, respectively). Studies conducted in Saudi Arabia revealed that ginger users infected with COVID-19 had a lower hospitalization percentage than nonusers (28.0% and 38.0%, respectively). Similar results were reported in studies conducted in Bangladesh, Iran, Tunisia, and some parts of Africa, which decreased the time for mechanical ventilation for patients suffering from COVID-19 pulmonary complications such as pneumonia and lung fibrosis (Jafarzadeh *et al.*, 2021).

On the other hand, curcumin [the main ingredient of turmeric (*Curcuma longa*)] and a common condiment in Jordan have also been reported by study participants as a self-care intervention (Rattis *et al.*, 2021). The antiviral effect of curcumin against the COVID-19 virus is mediated by inhibiting the binding of the viral S protein to the ACE2 receptor and the endosomal acidification required for processing the proteins. The anti-inflammatory, anticoagulant, and antithrombotic effects of curcumin proved their usefulness as adjunctive therapy in alleviating COVID-19 symptoms and have been reported in several studies (Vahedian-Azimi *et al.*, 2022). Interestingly, it has been reported that a 1,000 mg turmeric supplement was successfully used to restore smell and taste after COVID-19 infection (Chabot and Huntwork, 2021). Despite the reported interest of pharmacy customers in herbal medicine, it should be pointed out that other studies showed a decrease in interest among Jordanians in using herbs for other ailments (Al-Hamaideh and Dmour, 2023; Al-Qudah *et al.*, 2022).

Finally, study results emphasized the critical role of the health authorities (MOH/JFDA) and WHO bulletins in supplying the most recent information to the public, the participants' confidence in this information, and the participant's adherence to official sources to aid the public during the lockdown in the prevention and treatment of the infection. On the other hand, the decreased interest of participants in information published on social media (12.70%) shows its low influence on the pharmacists' choice as a source of reliable information. Most importantly, the low number of participants who attended awareness sessions regarding COVID-19 demands the need to make these sessions mandatory in the future since pharmacists acted as frontline healthcare providers for the public in coping with similar diseases.

STUDY LIMITATIONS

One of the current study's limitations is that cross-sectional studies cannot determine causality. In addition, young pharmacists are more accustomed to social media platforms and are more interactive with online surveys; however, anonymizing the participants (name, location, etc.) helps to decrease this bias. Even though the sample size in this study is limited, including participants from all Jordanian locations increases the representation of the study results. The results also explain the prevalence and consistency of the findings, which point to the necessity of applying the current study's findings to all Jordanian community pharmacies. It should be pointed out that the authors of this article conducted a similar study to explore the self-care measures adopted by Jordanians (number of participants > 500) to gain more insights into public practices during the lockdown (data not shown).

CONCLUSION

Throughout COVID-19 intermittent lockdowns, self-care interventions were common among the elderly and patients suffering chronic diseases in Jordan. Despite the decreased pharmacy sales, self-care measures like gloves, masks, disinfectants, and dietary supplements (zinc, vitamins C, B, and D) increased. To a lesser extent, the sales of prescription drugs like aspirin, hydroxychloroquine, and acyclovir were reported. Additionally, the interest in herbal medicines (like anise, lemon, honey, ginger, turmeric, and garlic) increased. Although many participants did not attend training workshops during the lockdowns, they tracked information supplied by the official health authorities (MOH, JFDA, WHO, and Jordan Pharmacists Association) about the pandemic. These results emphasize the necessity of awareness campaigns and continuous learning programs to ensure community pharmacists appropriately counsel their customers in future emergency conditions as frontline healthcare providers.

AUTHOR CONTRIBUTIONS

ID and KH contributed to the conceptualization, questionnaire design, focus, and organization of the manuscript. ID, KH, SQ, and JS performed the literature review and drafted the initial version of the manuscript. SQ and JS performed the statistical analysis in addition to the graph generation. All authors revised the review for content and contributed revised text, and all authors approved the final version of the submitted manuscript.

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CONFLICTS OF INTEREST

The authors declared no conflicts of interest concerning this article's research, authorship, and/or publication.

ETHICAL APPROVALS

All research activities were conducted under the study plan approved by the Ethics Committee of Al-Balqa Applied University (Approval number: 26/3/1/603). The electronic form of the questionnaire was entirely anonymous and did not allow identifying the participant's name or location. Informed consent was included in the questionnaire interface and obtained from all subjects involved in the study.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

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