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Role of community pharmacists in medication management during COVID-19 lockdown

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ABSTRACT

Preventive and control measures implemented by many countries to mitigate the spread of COVID-19 may negatively impact medication and chronic disease management, which can interfere with achieving patients' therapeutic goals. This study aims to evaluate the effect of the COVID-19 lockdown on these aspects, while exploring the role of community pharmacists. A cross-sectional study was conducted via a web-based questionnaire that targeted individuals who suffer from chronic diseases in Jordan. Participants were recruited by convenience sampling and were asked to self-report their ability to access medication, and the perceived role of community pharmacists. Among the 431 participants, the mean age ± SD (years) was 53.8 ± 13.7 and 60.1% (n= 259) were females. Participants mainly reported difficulties in accessing medication (n=198, 45.9%), reduced supplies or unavailability of medications (n=213, 49.4%), nonadherence to medications due to lack of access (n=98, 22.7%) and high costs (n=85, 19.7%). Participants avoided follow-ups due to a fear of infection (n=367, 82.5%) or prolonged waiting time in clinics (n=322, 74.7%). An increased reliance on the community pharmacy for medical advice was reported by 39.9% (n=172) of the participants, with half of them (n=217, 50.3%) depending on the pharmacists for advice regarding over-the-counter medications and COVID-19-related information (n=119, 27.6%). There is an urgent need to involve community pharmacists in medication and chronic disease management with a focus on patient adherence to ensure the optimal management of such vulnerable patient groups. Future studies to assess the effect of pharmacists' contributions towards enhancing medication/disease management are warranted.

KEYWORDS

Medication management; community pharmacists; COVID-19; chronic diseases; Jordan

1. Introduction

The coronavirus disease (or COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Although it was first reported in December 2019 in Wuhan City, China [1], the World Health Organization (WHO) declared it as a global pandemic due to the escalation of cases in most countries in March 2020 [2]. The severity of COVID-19 can range from its being an asymptomatic disease to potentially fatal, especially in the elderly and those who have co-morbidities [1,2]. Various preventive and control measures were implemented by affected countries [3], including Jordan, to mitigate the spread of the disease [4]. In addition to physical distancing and the obligatory use of face masks, the Jordanian government has enforced stringent restrictions and a nationwide lockdown that entailed the delivery of non-emergent health services at various health-care institutions, including major hospitals, as well as public and private clinics, followed by a gradual re-opening since early June 2020 [4].

Jordan is a relatively small country in the Middle East and North Africa (MENA) region, with a population count of around 10.7 million [5]. In 2019, The World Bank classified Jordan as an upper middle-income country [6]. The healthcare industry in Jordan amounts to approximately US$ 3.58 billion, representing approximately 10% of its Gross Domestic Product (GDP) (as spent on this sector), which is one of the highest in the MENA region [7]. The healthcare expenditure rate in Jordan is the third highest in the region and is rising at an annual rate of about 7%. There are 106 private and public hospitals in Jordan, providing 12,081 beds and serving the population of Jordan and further 250,000 patients from neighboring countries a year [8]. Jordan's healthcare system faces many challenges, which include a lack of universal health coverage, instability of the provision of facilities and financing systems, and an influx of refugees [9].

In the last 10 years, the Jordanian government's share of overall health expenditure has risen steadily from 45% in 2000 to 68% in 2011. Two main public health-care providers operate in Jordan: the Ministry of

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Health and the Royal Medical Services. They sell their programs to all residents at heavily subsidized rates, regardless of their level of income. The Ministry of Health provides care to all people and operates 30 hospitals, while the Royal Medical Services, with 11 hospitals, provides services to armed forces and their dependents. The National Health Accounts of Jordan showed that in 2008, 75% of the population was covered by some form of health insurance. Currently, civil health insurance and military medical insurance are the main health insurance entities in the country [10].

The most recent statistics indicate that Out-of-Pocket (OOP) funds constitute a large proportion of healthcare expenditure in Jordan. Jordan's OOP accounted for 42.3% of overall health spending, according to the 2008 National Health Accounts. According to the WHO global health expenditure database, OOP expenditure represented 30.4% of Jordan's total current health expenditure in 2017. Moreover, pharmaceutical spending accounts for almost half of the total OOP, while hospital spending (both public and private) accounts for 44% of the total OOP. Private clinic spending in Jordan accounts for a small fraction of OOP, with just 6% of OOP [10]. Therefore, a COVID-19 related lockdown could impose a substantial challenge for patients living with chronic diseases, as they require regular follow-ups with their health-care providers and a continuous supply of their prescribed medications, especially during a pandemic, when admission to health-care facilities and clinics may be restricted or postponed [11]. The latter could have an impact on the availability of medications, which can in turn adversely affect patients' adherence to their medications. The present COVID-19 restrictions, lengthy and complicated procedures at clinics, coupled with a fear of catching COVID-19 at health-care facilities could make patients reluctant to visit health-care providers for regular follow-ups and/or repeat medications [11]. Collectively, those challenges might hinder society's ability to achieve favorable therapeutic outcomes as a result of many chronic diseases [11,12].

Furthermore, the COVID-19 pandemic has drawn the world's focus toward the containment of the pandemic, which has involved recruiting the services of all health-care capacities, resources, and health professionals for this challenging task [13]. Thus, patients with chronic diseases may not receive the attention and management they need, leading to their disease prognosis worsening amid the current pandemic. Together with other health-care professionals, community pharmacists can contribute to the battle against COVID-19 by helping reduce the disease's burden on the healthcare system, by promoting medication adherence and through active involvement in the medication supply, along with effective medication management practices [11,14–18].

To the best of our knowledge, there are no published studies that have assessed the effect of COVID-19 confinement measures and lockdown on medications and chronic disease management in Jordan. Therefore, the overall objective of this study was to evaluate the effects of the COVID-19 lockdown on medication and chronic disease management, along with an emphasis on the role of community pharmacists in the management of chronic diseases as perceived by patients who suffer from chronic illnesses in Jordan.

2. Methods

2.1 Study design and participants

This research consists of a cross-sectional study that has targeted Jordanian society using an anonymous web-based questionnaire during the period of May–August 2020. Using Google Forms, which is a cloud-based survey tool (i.e. survey administration software) powered by Google™, a structured questionnaire was created for data collection. A link to our questionnaire was distributed on various social media platforms, including Facebook®, Facebook Messenger® and WhatsApp Messenger® and the participants were encouraged to further share the link with their relatives, friends, and their broader social network. Jordanians are very active on social media platforms so this was a valuable opportunity to reach people in a cost-effective and time-efficient way, considering the pandemic crisis, physical distancing, and other strict rules in the country. In addition, we sent the link to a list of people in the authors' social network as well. There is no official database that can be used by the researchers to reach Jordanian people (like a defined list of e-mails or so); thus, the only feasible way was reaching them through social media platforms. The eligibility criteria for participation were also described explicitly in the survey's cover letter.

Inclusion criteria for participation included: (i) Age ≥ 18 years, (ii) Residing in Jordan during the pandemic and its confinement measures, and (iii) Diagnosed with a chronic disease that requires regular medications and follow-up. To make sure that participants fulfilled the inclusion criteria, two questions were added at the beginning of the survey ('Are you an adult who is at least 18 years-old?' and 'Do you suffer from one or more chronic diseases'). Answering 'No' to any of these questions prevented the participants from completing the survey. The snowball convenience sampling technique was employed by encouraging participants to share the survey with their own social networks. We decided to collect data via a web-based questionnaire to reduce direct contact with the participants because of the pandemic situation and in order to reach potential participants in a time-efficient way

by eliminating geographical boundaries. In addition, during the gradual easing up of governmental restrictions and reopening of chronic diseases clinics, potential participants were contacted again on the same social media platforms during our data collection period to encourage those who had chronic diseases, and those who did not previously participate in our survey, to take part in the study. Selection bias was minimized through clearly identifying the study population (as previously discussed) and by selecting patients using rigorous criteria to avoid confounding results. The patients originated from the same general population [19].

2.2 Study instrument

The questionnaire contents were developed by the authors after reviewing the literature [20]. In order to translate the adopted contents from English into Arabic (the official language of Jordan), translation and back-translation techniques were employed by two independent bilingual translators. Then, the developed Arabic version was critically revised, and face-validated by several academic colleagues. A pilot test that involved 5 experts in the field and 10 participants from the general population was conducted, after which minor amendments were required to refine the questionnaire.

The final Arabic version of the questionnaire comprised four sections. The first section solicited socio-demographic data, such as age, gender, education, nationality (Jordanian vs. not), job (employed vs. not), monthly income (> than 500 vs. ≤500 JDs), insurance (governmental, private, military or other types), and chronic diseases. The second section assessed medication and disease management as perceived by the patients during the COVID-19 lockdown. Specifically, they were asked if they struggled with maintaining a healthy lifestyle (explained to participants as a balanced diet of five servings of fruits/vegetables per day, low in saturated fat, and with balanced amounts of complex carbohydrates, proteins and fat as well as moderate exercise activity equivalent to aerobic activity for 30 minutes 3 times daily). Moreover, they were asked about who is responsible for obtaining and administering their medications, if they faced any difficulties in accessing their medications or their regular prescription and if their ability to take prescribed medications was negatively impacted due to a lack of access or high costs. Also, they were asked if they had reduced their follow-up visits due to a fear of infection or lengthy procedures. In addition, participants were asked if they had fears of catching COVID-19 as a result of their visits to health-care centers, and if the frequency of their regular checkup tests (such as blood pressure, blood glucose, etc.) were reduced. Participants were also asked if they felt less optimistic about their disease management, and if they had experienced more complications (explained to participants as acute and/or long-term consequences of the chronic disease as per categories in Table 2)

The third section of the questionnaire aimed to assess the role of pharmacists in chronic disease management as perceived by patients. Participants were asked to report the extent of their reliance on and trust of community pharmacists with regard to over-the-counter (OTC) or prescription medications, as well as their credibility as a source of COVID-19 related information. Moreover, participants were asked if they felt safer to order their medications in community pharmacies either in person or by phone. Lastly, the fourth section assessed the self-care practices performed by patients to boost their immunity amid the pandemic crises, such as eating healthy food, drinking more warm water, and taking vitamin C. The study instrument was also tested for psychometric properties in terms of internal consistency and reliability.

2.3 Sample size and statistical analysis

A minimum required sample of 385 participants was estimated based on the following equation [21]:

$$N = \frac{PQ(Z_\alpha)^2}{d^2}$$

where N is the sample size; *Za*: type one error = 1 · 96 when α = 5%; *Q*= 1-P: expected non-prevalence; *P*= proportion in the population possessing the characteristic of interest (based on the estimate that 50% of the participants have positive attitudes toward COVID-19 and its preventive measures); and d = one-half of the desired interval of confidence, which in this study is *d* = 5%.

Accordingly, by filling in the equation, N = 0.5 x 0.5 $(1.96)^2/0.05^2$ = 385.

Statistical analysis was performed using SPSS version 20.0 (SPSS Inc., Chicago, IL). Descriptive statistics were used to describe the demographic characteristics of the participants. Categorical variables were presented as valid percentages to account for the missing data with their frequencies, while continuous variables were presented as mean with standard deviation (SD). Chi-square test was used to find the associations between the categorical variables. All hypothesis testing was two-sided. A *P*-value of <0.05 was considered statistically significant.

2.4 Ethical considerations

The study protocol was approved by the Institutional Review Board at the Deanship of Academic Research at the University of Jordan (IRB No. 44/2020). Moreover, this study was conducted conforming to the Declaration

of Helsinki. The first page of our questionnaire included information about the nature and aims of the study as well as inclusion criteria for participation. Participants were asked not to identify themselves in any way. Participation was voluntary, and our questionnaire ensured confidentiality and anonymity of study participants.

3. Results

3.1 Sociodemographic characteristics of participants

Our study's instrument demonstrates satisfactory psychometric properties in terms of internal consistency and reliability. Cronbach's alpha for the items related to the role of community pharmacists in medication management during the COVID-19 lockdown was 0.781, and for self-care practices among participants it was 0.816, which is considered satisfactory [22]. About 701 participants were reached via Google Forms, but 270 were excluded as they did not suffer from chronic diseases. A total of 431 participants completed the survey questionnaire. The mean age (years) of the respondents was 53.8 ± 13.7. More than half of them were females (n = 259, 60.1%) vs. males (n = 172, 39.9%). All participants were Jordanians. The majority of the respondents were married (n = 355, 82.4%) vs. single (n = 35, 8.1%) or others (n = 41, 9.5%). Almost a third of them had a university level education (n = 162, 37.6%), and 15.5% (n = 67) had a postgraduate degree. A third of the study sample (n = 148, 34.3%) were employees and 10.9% (n = 47) of them worked in the medical field. More than half of the sample (n = 231, 53.4%) had an income of equal or less than 500 JD. According to the Atlas of Jordan, an income of 500 JD per month (6000–7000 per year) is considered middle class. An income below 6000 JD per year is lower middle class and above the poverty line, while an income above 7000 JD per year is considered upper middle and affluent class [23]. The majority of the study participants (n = 357,82.8%) had insurance and more than half (n = 226, 52.4%) of them had governmental insurance. Full sociodemographic characteristics of participants are illustrated in Table 1.

Table 1. Sociodemographic characteristics of all participants (n = 431).

Variables	% (n)
Age in years [mean score ± SD]	53.8 ± 13.7
Gender	
Male	39.9 (172)
Female	60.1 (259)
Nationality	
Jordanian	100 (431)
Non-Jordanian	0 (0)
Marital status	
Married	82.4 (355)
Single	8.1 (35)
Others	9.5 (41)
Educational level	
Postgraduate	15.5 (67)
University level	37.6 (162)
Diploma	15.1 (65)
General certificate exam or high school	21.8 (94)
Elementary school	10.0 (43)
Employment status	
Working	34.3 (148)
Not working	35.3 (152)
Retired	30.4 (131)
Education in the health or medical field (yes)	
Work in the medical field (yes)	10.9 (47)
Income	
Less than or equal 500 JD	53.6 (231)
More than 500 JD	46.4 (2000
Medical insurance (yes)	82.8 (357)
Medical insurance type	
Governmental	52.4 (226)
Private	18.3 (79)
Royal medical services	6.3 (27)
Others	16.5 (71)

3.2 Participants' medication and disease management during COVID-19 lockdown

The highest prevalence of chronic diseases among the study participants was hypertension (n = 247, 57.3%) and diabetes (n = 232, 53.8%), whereas the lowest prevalence was stroke (n = 10, 2.3%). The majority of the participants were responsible for administrating (n = 401, 93.0%) and obtaining (n = 309, 71.7%) their own medications. Almost half of the participants (n = 198, 45.9%) had difficulty accessing their medication. Furthermore, reduced supplies or unavailability of the medication was noticed by almost half of the participants (n = 213, 49.4%).

Importantly, about a quarter of the participants stopped or decreased medication intake during the COVID-19 lockdown due to an inability to access drugs at clinics where they are insured (n = 98, 22.7%) or because of high costs (n = 85, 19.7%). Most of the participants avoided hospital revisits or follow-ups due to a fear of infection (n = 367, 82.5%) or long waits in the clinic (n = 322, 74.7%). About half of the participants (n = 181, 42.0%) felt that they were at increased risk of being infected by COVID-19 due to their chronic medical conditions. More than half of the participants decreased the frequency of either their self-monitoring (n = 288, 66.8%) or the frequency in which a physician monitored their medical conditions (n = 309, 71.7%), which could be due to these respondents being less hopeful or less motivated to control their disease amidst the pandemic, less than a quarter of the participants (n = 87, 20.2%) did not feel optimistic regarding the improvement of their diseases due to COVID-19. The most encountered complication during the lockdown was hyperglycemia (n = 348, 80.7%). Participants' medication and disease management during COVID-19 lockdown is illustrated in Table 2.

With regard to the non-pharmacologic therapy of their chronic diseases, about 31% of the participants struggled in keeping a healthy lifestyle (always and

Table 2. Medication and disease management.

Variables	% (*n*)
Chronic diseases *	
Hypertension	57.3 (247)
Diabetes	53.8 (232)
Ischemic heart disease	17.2 (74)
Chronic heart failure	6.7 (29)
Respiratory diseases (asthma and COPD)	10.9 (47)
Stroke	2.3 (10)
Osteoporosis	3.2 (14)
Tachycardia or atrial fibrillation	2.8 (12)
Thyroid diseases	7.4 (32)
Rheumatoid arthritis	3.0 (13)
Cancer	3.2 (14)
Other diseases	25.5 (110)
Who is responsible for getting your medications	
Myself	71.7 (309)
One of the sons	16.7 (72)
One of the relatives	7.9 (34)
Others	16 (3.7)
Who is responsible for administering your medications?	
Myself	93.0 (401)
One of the sons	3.5 (15)
One of the relatives	1.2 (5)
Others	2.3 (10)
Have you felt that you have difficulty in accessing your medication? (Getting your regular prescription)	45.9 (198)
Have you noticed a decrease or non-availability of medications?	49.4 (213)
Have you stopped or decreased medications intake because of inability to access where you're insured	22.7 (98)
Have you stopped or decreased medication intake because of high cost	19.7 (85)
Have you avoided hospital revisits due to fear of infection?	82.5 (367)
Have you avoided hospital follow-up visits due to long waiting time?	74.7 (322)
Have you felt that you are at increased risk to develop COVID-19, as you have chronic medical conditions?	42.0 (181)
Have you decreased the frequency of monitoring your diseases by decreasing the number of follow ups (for example, blood glucose or BP monitoring)?	66.8 (288)
Have the frequency of monitoring of your disease decreased by the physician	71.7 (309)
Do you feel that you are less optimistic regarding improving your diseases because of COVID-19	20.2 (87)
Have you had more frequent complications?	
Hyperglycemia	80.7 (348)
Diabetic foot infections	10.2 (44)
Hypoglycemia	5.1 (22)
Increased blood pressure	4.4 (19)
Hypotension	3.9 (17)
Chest pain	7.0 (30)
Dizziness	11.8 (51)
Acute heart failure	0.2 (1)
Shortness of breath	10.9 (47)
Asthma or COPD exacerbation	3.5 (15)
Others	7.9 (34)

**participants were asked to choose diseases as many as apply to them.*

often), including keeping up with their exercise and a suitable diet (Figure 1).

3.3 Role of community pharmacists in medication/disease management during COVID-19 lockdown as perceived by the public

Table 3 summarizes the role of community pharmacists in medication management during the COVID-19 lockdown. More than a third (n = 172, 39.9%) of the participants had an increased reliance on the community pharmacy for medical advice about their diseases and prescription-only medications. Half of them (n = 217, 50.3%) depended on the community pharmacist for medical advice regarding over-the-counter medications and about a third (n = 119, 27.6%) for COVID-19 related information. Half of the participants (n = 225, 52.2%) had increased trust in the community pharmacist during COVID-19 lockdown compared to pre-COVID-19. During the COVID-19 lockdown, about half of the participants (n = 237, 55.0%) utilized more home delivery services to get their medications and a third of them (n = 130, 30.2%) relied more on phone consultations. Importantly, 41.5% (n = 179) of the participants felt safer visiting the community pharmacy to avoid unnecessary hospital visits. Only 7.9% (n = 34) of the participants stated that the community pharmacy had an isolation room for patients suspected of being affected by COVID-19. However, the majority of the participants (n = 348, 80.7%) revealed that community pharmacists were compliant with COVID-19 preventative measures, including practicing social distancing and wearing gloves and masks. Interestingly, after the quarantine is over, about a third of the participants stated that they would keep on using home delivery (n = 158, 36.7%) and phone consultation (n = 140, 32.5%) services.

3.4 Self-Care Practices Among Participants

Table 4 sums up participants' practices to prevent COVID-19 infection.

Less than 10% (n = 39) drank warm water every 1–2 hours and used saline gargles. Notably, 27.8% (n = 120) increased their consumption of orange, lemon, and leafy vegetables, while 11.8% (n = 51) consumed vitamin C tablets. Moreover, a few of the participants consumed nuts (n = 62, 14.4%), and bananas (n = 76, 17.6%) to boost their immune systems.

3.5 Factors affecting medication and disease management during COVID-19 lockdown

Difficulties in getting access to medications (getting regular prescriptions) were not significantly different between males and females (50.0% vs. 43.2%, respectively; p value = 0.168), nor was it significantly different

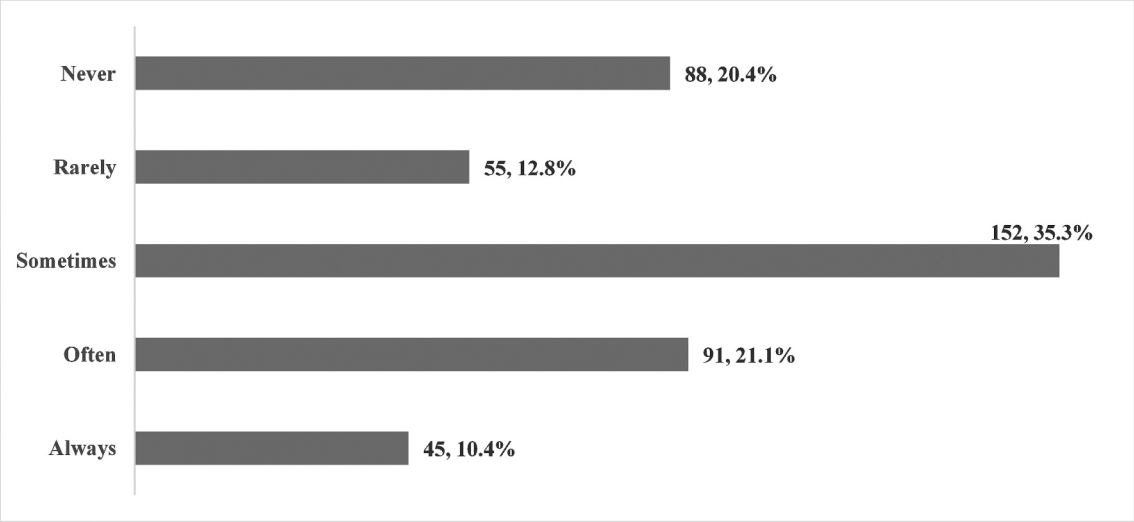

Figure 1. Number of participants who have struggled in keeping up a healthy lifestyle (for example: exercise, diabetic diet, DASH diet).

Table 3. Role of community pharmacists in medication management during COVID-19 lockdown.

Variables	% (*n*)
Have you relied more on your community pharmacist for medical advice about your disease and prescription medications?	39.9 (172)
Have you relied more on your community pharmacist for medical advice about your over the counter medications?	50.3 (217)
Have you referred for your pharmacist about COVID-19 related information?	27.6 (119)
Has your trust in your community pharmacist increased?	52.2 (225)
Have you relied more on home delivery services to get your medications?	55.0 (237)
Have you relied more on phone consultation?	30.2 (130)
Have you felt safer visiting the pharmacy to avoid unnecessary hospital visits?	41.5 (179)
Do community pharmacy that you visit have an isolation room for patient suspected with COVID19 patients?	7.9 (34)
Were the community pharmacists you visited compliant to COVID-19 preventative measures including social distancing, wearing gloves and masks?	80.7 (348)
After quarantine is over, would still use home delivery services?	36.7 (158)
After quarantine is over, would still use phone consultation?	32.5 (140)

between participants who work in the medical field and those who do not (36.2% vs. 47.1, respectively; p value = 0.154).

On the other hand, medication access was associated with the participants' educational level, where those with a secondary education (12 years of education or less) faced greater difficulty in accessing their medications than those with higher educational levels. That is, 69.8% of the participants with less than 12 years of study and 66.0% of the participants with a high school level education experienced more difficulty compared to 38.5%, 37.0%, and 31.3% of the participants with a diploma, university degree, or postgraduate degree, respectively (p value <0.005).

In addition, participants with lower income (73.2% vs. 26.8% (higher income), p value <0.005) and participants who are unemployed (43.9% vs. 28.3% (employed) or 27.8% (retired), p value <0.005) faced more difficulties in accessing their medications. Interestingly, participants with medical insurance experienced more difficulty in accessing medications and getting regular prescriptions (49.6% (insured) vs. 28.4%, (uninsured), p value <0.005). Similarly, participants with governmental insurance experienced more difficulty in accessing medications compared to other types of medical insurance (67.7% [governmental] vs. 19.0 [private], 14.8% [military royal medical services hospitals], and 28.2% [others], p value <0.005).

Table 4. Participant's practices to prevent COVID-19 infection.

Practices	Always	Often	Sometimes	Rarely	Never
			% (n)		
Drinking warm water every hour	9.0 (39)	21.8 (94)	30.2 (130)	19.3 (83)	19.5 (84)
Gargling with saline solution	4.9 (21)	9.0 (39)	38.7 (167)	18.6 (80)	28.5 (123)
Increase consumption of orange, lemon and leafy vegetables	27.8 (120)	39.2 (169)	21.1 (91)	7.0 (30)	4.6 (20)
Consuming vitamin C tablets	11.8 (51)	16.5 (71)	29.2 (126)	14.6 (63)	27.6 (119)
Consuming nuts	14.4 (62)	33.2 (143)	31.8 (143)	11.6 (50)	8.8 (38)
Consuming banana to boost immune system	17.6 (76)	42.0 (181)	25.5 (110)	7.9 (34)	6.7 (29)
Consuming sesame oil and olive oil to protect throat and lungs	3.7 (16)	10.7 (46)	35.5 (153)	21.1 (91)	28.8 (124)

A decrease in or unavailability of medications was noticed more by those with high school education or less (72.1% had less than 12 years' education and 59.6% high school vs. 43.1% diploma, 45.1% university level, and 37.3% postgraduate level, p value <0.005). In addition, a higher percentage of participants with lower income (62.3% vs. 34.5% (higher income), p value <0.005) and medical insurance (52.7% (insured) vs. 33.8% (noninsured), p value = 0.003) noticed a decrease in or unavailability of medications. A higher percentage of participants with governmental or royal medical services insurance noticed a decrease in or unavailability of medications compared to other types of medical insurance (65.0% [governmental] and 55.6% [royal medical services] vs. 26.6% [private] and 25.0% [others], p value <0.005).

A higher percentage of participants with high school education (or less) stopped their medications because of difficulties in accessing the medical services where they are insured (37.2% [less than high school] and 36.2% [high school] vs. 18.5% [diploma], 16.7% [university level], and 13.4% [postgraduate degree]). In addition, a higher percentage of participants with lower income stopped their medications because of difficulties in accessing the medical services where they are insured (29.0% vs. 15.5% (non-insured), p value = 0.001). A higher percentage of participants with governmental insurance (32.3%) stopped their medications because of difficulties in accessing the medical services where they are insured compared to participants with other medical insurance types (5.1% [private], 18.5% [royal medical services], and 7.1% [others], p value <0.005).

A higher percentage of participants with high school education (or less) stopped their medications because of high costs (27.9% [less than high school], 40.4% [high school] vs. 12.3% [diploma], 10.5% [university level], and 14.9% [postgraduate degree], p value <0.005). In addition, a higher percentage of participants with lower income stopped their medications because of high costs (26.8% (Yes) vs. 11.5% (No), p value <0.005). A higher percentage of participants with governmental insurance (25.7%) stopped their medications because of difficulties in accessing the medical services where they are insured compared to participants with other medical insurance types (5.1% [private], 14.8% [royal medical services], and 10.7% [others], p value <0.005).

3.6 Factors associated with more disease complications

Factors associated with further complications were also assessed and are tabulated in Table 5. While gender was not significantly associated with further complications (37.8% [males] vs. 31.7% [females], p-value = 0.189), educational level was significantly correlated to more complications; those with elementary education had more frequent complications (51.2% [elementary education] and 56.4% [high school] vs. 30.8% [diploma], 23.5% [university degree], and 20.9% [postgraduate level], p-value <0.005).

Participants with lower income experienced more complications compared to those with higher income (42.0% vs. 25.0%, respectively, p value <0.005). Participants not working also had more complications (45.4% [unemployed] vs. 27.7% [working] and 28.2% [retired], p value = 0.001). Those working in the medical field had lower complications compared to non-medical field workers (19.1% vs. 35.9%, respectively, p value = 0.022).

Patients who noticed a decrease or unavailability of medications experienced more complications (42.7% vs. 25.7%, p value <0.005). Similarly, participants who had difficulties in getting their regular prescriptions had more complications (47.5% vs. those with no difficulties (22.7%), p value <0.005). Likewise, those who stopped or decreased their medication intake because of high costs had a higher rate of complications (58.8% (Yes) vs. 28.0% (No), p value <0.005). A higher percentage of participants who avoided hospital visits due to fear of infection (36.8% vs. 18.8%, p value = 0.005) or due to long procedures and the time needed experienced further complications (39.1% vs. 19.3%, p value <0.005). In addition, a higher percentage of participants who had a fewer number of follow-up visits by a physician had more complications (39.2% (Yes) vs. 21.3% (No), p value <0.005). Importantly, participants who were less optimistic in regard to improving their disease status due to COVID-19 had more complications (48.3% (Yes) vs. 21.3% (No), p value <0.005).

4. Discussion

In this study, most of the participants had hypertension and diabetes, which is aligned with their actual prevalence in the Kingdom [24,25]. Interestingly, this study showed that during the last 2 months of the lockdown period, a sizable portion of patients had difficulty accessing their medications (45.9%) and almost half of them had a reduced supply of medications, or received none at all. In addition, adherence to their medications was negatively impacted because approximately a quarter of the participants were unable to access the health-care clinics where they were insured and in other clinics where they were not insured, the cost of their medications was prohibitive. The vast majority of patients were reluctant to visit hospital clinics to follow-up on their chronic medical conditions due to a fear of infection (82.5%) or due to long complicated restriction procedures implemented (74.4%). Unfortunately, more than half of the participants decreased the frequency of either their self-monitoring (66.8%) or the physician monitoring (71.7%). The most encountered complication during

Table 5. Factors associated with more complications.

Variables	% (*n*)	P value
Gender		0.189
Male	37.8 (65)	
Female	31.7 (82)	
Educational level		<0.005
Postgraduate	20.9 (14)	
University level	23.5 (38)	
Diploma	30.8 (20)	
General certificate exam or high school	56.4 (53)	
Elementary school	51.2 (22)	
Employment status		0.001
Working		
Not working	45.5 (69)	
Retired	28.2 (37)	
Income	27.7 (41)	<0.005
Less than or equal 500 JD	42.0 (97)	
More than 500 JD	25.0 (50)	
Work in medical field		0.022
Yes	19.1 (9)	
No	35.9 (138)	
Medical insurance		0.069
Yes	32.2 (115)	
No	43.2 (32)	
Medical insurance type		0.002
Governmental	39.4 (89)	
Private	19.0 (15)	
Royal medical services others	37.0 (10)	
Others	14.3 (4)	
Having difficulty in getting regular prescription		<0.005
Yes	47.5 (94)	
No	22.7 (53)	
Noticed decrease or unavailability of medications		<0.005
Yes	42.7 (91)	
No	25.7 (56)	
Stopped or decreased medication intake due to inability to access the clinic where you are insured		<0.005
Yes	55.1 (54)	
No	27.9 (93)	
Stopped or decreased medication intake due to high cost		<0.005
Yes	58.8 (50)	
No	28.0 (97)	
Decreased hospital visits due to fear of infection		0.005
Yes	36.8 (135)	
No	18.8 (12)	
Decreased hospital visits due to long procedures and time needed		<0.005
Yes	39.1 (126)	
No	19.3 (21)	
Decreased number of diseases follow up by physician		<0.005
Yes	39.2 (121)	
No	21.3 (26)	
Less optimistic in regard with improving their disease states due to COVID-19		<0.005
Yes	48.3 (42)	
No	21.3 (48)	

the lockdown was hyperglycemia (80.7%). About 10% of the participants struggled to keep a healthy lifestyle (always), which included doing exercise and maintaining good dietary habits.

Based on this, the role of community pharmacists should be emphasized. The results from this study show that more than a third of the participants increased their reliance oncommunity pharmacists for medical advice about their diseases or prescription-only medications, while half of them depended on them for medical advice concerning over-the-counter medications. Also, about a third of the participants approached the community pharmacist for COVID-19 related information. As expected, half of the participants had increased trust in the community pharmacist during the COVID-19 lockdown compared to pre-COVID-19. During the COVID-19 lockdown, more than half of the participants utilized home delivery services to get their medications and a third of them relied more on phone consultations for advice. Importantly, 41.5% of the participants felt safer visiting the community pharmacy rather than the hospital, and the majority of the participants (80.7%) stated that community pharmacists were compliant with COVID-19 preventative measures, which includes social distancing and wearing gloves and masks. According to participants, community pharmacists were adherent to guidelines issued by the Ministry of Labor in collaboration with the National Epidemiology Committee, Jordan Pharmacists Association, and the Jordan Food and Drug Administration (JFDA) to ensure safety measures for infection control in pharmacies were applied [17].

Moreover, our results are in line with the results of Abdel Jalil *et al*. [18], which state that pharmacists have good COVID-19 related knowledge, and thus, they can be considered a trustworthy source for information. Furthermore, pharmacists had a positive perception of their new activities during this pandemic, especially in terms of patient education about the symptoms of COVID-19, its mode of transmission, along with the best preventive measures [18].

In the current study, the availability or access to medications is associated with many socioeconomic factors. Those with lower education levels, less income, and those who were unemployed faced more difficulty accessing their medications. Interestingly, those with medical insurance (especially governmental) had less chance of medication access. This might be due to the participants' reduced ability to reach clinics where they have insurance. The reduced access and/or high cost of medications led participants to stopping medication in the aforementioned societal statuses. Parallel to those findings, disease complications were also found to be significantly correlated with lower educational level and lower income.

On the other hand, those working in the medical field experienced fewer complications. Predictably, those who had less access to medications, stopped medications, had fewer hospital visits (due to fear of infection or lengthy procedures) or had fewer follow-up visits were more likely to suffer from disease complications. From a more psychological perspective, patients who were less hopeful or optimistic about their disease due to COVID-19 had more complications. Our results confirm findings from previous studies that investigated the relationship between socioeconomic status (SES) and access to health care and disease outcomes for patients. In concordance with our results, Saydah *et al*. found that health-care access, level of education and psychological distress increased the likelihood of mortality in U.S. diabetic adults [26]. In addition, a nationwide study of 16 million hypertensive patients in China by Lee *et al*. [27] showed that low SES and poor adherence to antihypertensive medication are associated with increased mortality and cardiovascular disease risks, especially in patients with low income. In Canada, low SES was a strong predictor of death, non-fatal myocardial infarction, or non-fatal stroke in adult diabetic patients who are younger than 65 years old [28].

To the best of our knowledge, this is the first study to assess the effect of COVID-19 on medication and disease management. In addition, this study has highlighted the role of pharmacists (as perceived by patients) in the management of chronic illnesses. Yet, our study is not without limitations, which should be taken into account when interpreting the results. These include: (i) A convenient sampling method was used, which limits the generalizability of the results. However, we believe that the method used here was the only sampling strategy attainable during the current circumstances of the pandemic. Within the same context, as the link to the questionnaire was sent to the contact lists of the authors, friends and relatives, selection bias was minimized through clearly identifying the study population, as previously discussed, and by selecting patients using clear criteria to avoid confounding results. Patients should therefore originate from the same general population. All the study participants were Jordanians; thus, we may have missed the perspectives of non-Jordanians regarding this topic. A web-based survey was used which also affects the representativeness of our sample. As this survey was self-administered, we could have missed the participation of illiterate people. Moreover, causality was not assessed, which is inherent to cross-sectional studies.

5. Conclusion

This study showed that many Jordanians had experienced decreased access to their medications and had fewer checkup visits, especially for those with lower SES. As expected, patients had an increased trust in and reliance on their pharmacists with regard to their prescriptions as well as OTC medication, in addition to COVID-19 related information. The latter highlights that community pharmacists can play a major role and be of significant value in managing chronic diseases amidst a global crisis. They can also therefore act to ease the burden on health-care systems. Community pharmacists should utilize this trust to promote patients' adherence to their medications, support rational medication uses, and perform medication-reviews and follow-ups. Furthermore, greater governmental effort is required to decrease disparity of health care among those with lower SES. Future studies should focus on assessing, longitudinally, the effect of community pharmacists' contribution to enhancing medication adherence and disease/medication management during pandemics and other times of crises.

Disclosure statement

No potential conflict of interest was reported by the authors.

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