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Medications and natural products used in Jordan for prevention or treatment of COVID-19 infection during the second wave of the pandemic: A cross-sectional online survey

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ABSTRACT

Worldwide, during the COVID-19 pandemic in 2019, there was an increase in the tendency of misusing prescription drugs as well as self-medicating with over-the-counters. Additionally, an increase in the use of herbs and natural products was reported. A descriptive cross-sectional survey was conducted in Jordan from May 19th to July 29th, 2021, to assess the medications and natural products used in Jordan during the second wave of the pandemic. The survey was developed and validated, then distributed using *Google Forms* via social media platforms. Data was analyzed using Statistical Package for Social Sciences-24. The study participants (n = 386) had a mean age of 29.35 (SD = 11.90) years. Most of participants were females (72.8%), not married (64.5%), non-smoker (69.2%), have a Jordanian nationality (80.6%), hold a bachelor's degree (73.1%), and living in the middle of Jordan (74.1%). More than 70% of the participants used vitamin C, D and pain relievers. The most used natural products were citrus fruits (78.8%), honey (63.0%) and ginger (53.1%). The participants reported that family and friends (55.4%) played a major role in advising them to use medications and dietary supplements. Pharmacists ranked second (54.1%), followed by social media platforms (43.3%). Multiple logistic regression analysis highlighted that only the age significantly affected the participants' use of medications and natural products (P < 0.001). The results of this study warrant the need of conducting awareness campaigns guided by trained healthcare providers to educate people and minimize the risk of side effects that may arise from unsupervised use of medications and natural products.

1. Introduction

Coronavirus is a family of viruses causing respiratory infections (Rajnik et al., 2021). One highly contagious coronavirus strain that is associated with high morbidity and mortality is the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), as officially named by the International Committee on Taxonomy of Viruses (ICTV) (Rajnik et al., 2021), which is responsible for the Coronavirus Disease 2019 (COVID-19) (ICTV Executive Committee 2020 - 2023). Common COVID-19 infection symptoms include fever, fatigue, cough, headache, muscle pain and diarrhea (Centers for Disease Control and Prevention 2021). Whereas, the severe form of the disease can progress to respiratory failure, life-threatening pneumonia, multi-organ failure and death (Centers for Disease Control and Prevention 2021). The World Health Organization (WHO) declared COVID-19 a pandemic disease on March 11th, 2020 (World Health Organisation 2020). As of August 3rd, 2021, COVID-19 has infected over 201 million people worldwide (Johns Hopkins University & Medicine 2021). The Jordanian Ministry of Health (MOH) announced the first confirmed COVID-19 case in Jordan on March 2nd, 2020 (Ministry of Health-The Hashemite Kingdom of Jordan 2020). Consequently, lockdown measures were imposed to limit the spread of the virus, particularly due to the absence of treatment regimens and vaccines in the early stages of the pandemic.

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Worldwide there was an increase in the tendency of misusing prescription drugs as well as self-medicating with prescription or over-the-counter (OTC) drugs for the prevention or treatment of COVID-19 (Yáñez et al., 2021). For example, it was reported in India and Togo that hydroxychloroquine and chloroquine were used without a prescription for the prevention of COVID-19 infection. (Chauhan et al., 2020, Malik et al., 2020, Sadio et al., 2021). Moreover, hydroxychloroquine, azithromycin, penicillin and antiretrovirals were found to be used for self-medication of COVID-19 symptoms in Peru (Quispe-Canari et al., 2021).

Vitamins and minerals such as vitamin C, D, and zinc are required for proper immune function in humans, and clinical deficiencies of these nutrients were shown to increase susceptibility to infections (Calder et al., 2020). They gained popularity during the pandemic along with other natural supplements, however, some of the dietary supplements including botanicals do not have essential physiologic roles and have no single straightforward measure of immune system function or resistance to disease (National Institutes of Health- Office of Dietary Supplements 2021). Regardless of the potential benefits, there are significant adverse effects and herb-drug interactions associated with herbal products, particularly when self-medicating. A common example is the interaction between *Ginkgo biloba* and a widely used antiplatelet medication, warfarin, which significantly increases risk of bleeding (Charan and Biswas 2013). Another famous example is the interaction of grapefruits with calcium antagonists, benzodiazepines, antihistamine and other medications causing significant clinical effects (Jha et al., 2009).

At present, data supporting recommendations for or against the use of dietary supplements, vitamins, or herbs to prevent or cure COVID-19 is insufficient. Nevertheless, according to a world-wide infodemiologic study conducted after the emergence of COVID-19, there was a global growth in the sales of dietary supplements by the general population to boost immunity, protect against or cure COVID-19 (Çimke and Gürkan 2021). Despite COVID-19 vaccines being available and pharmacological treatment regimens being developed, the interest in dietary supplements remains elevated. In Jordan, there is a high prevalence of herbal medicine use reaching 53.3% with more than 52% of the population believing that these products can treat diseases (Issa and Basheti 2017), as shown in a cross-sectional study (n = 1820) prior to COVID-19 (Abdel-Qader et al., 2020). In a more recent cross-sectional study (n = 789) it was reported that 70% of the study participants reported use of medicinal plants (Thiab et al., 2021). Common reasons for the use of natural products were chronic disease treatment, weight loss, or improving well-being (41.9%, 23.6%, and 16.2%, respectively) (Abdel-Qader et al., 2020, Thiab et al., 2021). Prevalence and patterns of use of natural products during COVID-19 has been an area of interest, for which multiple surveys have been conducted (Ahmed et al., 2020, AlNajrany et al., 2021, Nguyen et al., 2021, Srikanth et al., 2021).

Therefore, objectives of this cross-sectional survey were to estimate the prevalence and choice of medications and natural products used in Jordan during the COVID-19 pandemic, to identify the participant's source of advice regarding the use of these products, and to evaluate the perception of symptom improvement after using these products among participants that were infected with the virus. Such outcomes can provide an insight into important health management issues during COVID-19 pandemic, and guide healthcare providers and policymakers in conducting a suitable awareness campaign to educate the Jordanian population about the effects of unsupervised use of medications and natural products.

2. Methods

2.1. Study design and participants

The objectives of the study were addressed in a descriptive cross-sectional electronic survey. It was conducted in Jordan from May 19th to July 29th, 2021. The survey was developed and validated to obtain anonymous responses that were kept confidential. Any adult living in Jordan was eligible to participate. Our study participants were recruited via social media platforms such as Facebook®, WhatsApp®, LinkedIn®, and Twitter®.

Participation in this study was voluntary and the participants who completed the survey were deemed to have given their informed consent to participate in this research.

2.2. Ethics approval

The study received ethical approval from the Faculty of Pharmacy, Applied Science Private University (Approval number: 2021-PHA-20). Before starting the survey, participants can view the ethics committee approval upon request. The participants' confidentiality was maintained, and their names were not included.

2.3. Survey development, validation, and reliability

After analyzing validated surveys in the literature, the study survey was developed and designed with the use of the general concepts of good survey design (Ahmed et al., 2020, Charan et al., 2020, Abdullah Alotiby and Naif Al-Harbi 2021, AlNajrany et al., 2021, Quispe-Canari et al., 2021, Srikanth et al., 2021). Several sources were consulted to compile a list of questions that were thought to be related to the study objectives.

Google Forms was used to generate the online survey. It was written in English but delivered to participants in Arabic as it is Jordan's official language. Multiple-choice questions were chosen to be included in the survey, and the survey was designed to be completed within 15 min.

The first draft of the survey was examined by twelve experienced independent academics and one statistician to guarantee face validity.

The comments and input they provided were considered and integrated into the final version of the survey when appropriate. Two senior academic staff members who are fluent in both Arabic and English translated the survey from English to Arabic and back. There were no medical jargon or technical vocabulary in the questions, and popular trade names of medications were mentioned to help participants in recognizing the medications of interest.

Finally, the survey was piloted with a group of 25 academics and 25 non-academics to improve clarity, readability, and understandability, as well as to ensure its applicability to the Jordanian population. Internal consistency reliability was tested by the Cronbach's alpha coefficient.

The final version of the survey contained four parts; with the first part designed to collect data on the participants' socio-demographic characteristics; the second part was designed to collect information about the medications/supplements used where a list of common medications and vitamines was provided; the third part was prepared to collect information about the herbs/natural products used, similarly a list of herbs and natural products that were reported to be used increasingly in Jordan during COVID-19 pandemic were included (Fudailat 2020); and the fourth part was filled only by participants who were infected with the virus to

evaluate the perception of symptom improvement after using these products. The symptoms included in this part were provided by the Centers for Disease Control and Prevention (CDC) (Centers for Disease Control and Prevention 2021).

2.4. Sample size

Currently, Jordan adult population is estimated at 4.784250 million (Department of Statistics 2021). Based on that, calculating the sample size, using a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%, a minimum sample size of 385 is needed (Eng 2003, Charan and Biswas 2013, Taherdoost 2017). The number of participants in this study was 390.

2.5. Statistical analyses

Following data collection using *Google Forms*, the survey responses were extracted and coded then exported into a customized database using the Statistical Package for the Social Sciences (SPSS), Version 24.0 (IBM Corp., Armonk, New York, USA). The descriptive analysis was undertaken using means and standard deviations for continuous variables and percentages for qualitative variables.

Screening the factors that may affect using medications and herbs was carried out using simple logistic regression. For multiple logistic regression analysis, the variable entry criterion was set to 0.25, in that any variable that was found to be significant during 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 medications and herbs use. 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. Medications (n = 10) use was coded as follows [0: No, 1: Yes], where "Yes" indicated participants who used five medications or more (out of 10), the same scenario was applied for herbs (n = 11).

3. Results

The final number of participants reached 390, however, four participants did not consent to use their responses in this study, thus, 386 responses were included in the statistical analysis.

3.1. Demographic characteristics

The study participants (n = 386) had a mean age of 29.35 (SD = 11.90) years. Most of the participants were females (72.8%), not married (64.5%), non-smoker (69.2%), have a Jordanian nationality (80.6%), hold a bachelor's degree (73.1%), and were living in the middle of Jordan (74.1%), where the Capital (Amman) is located, hosting about 42% of Jordan's population (Department of Statistics 2019). Regarding participants' professions, 15.0% were employees in the medical sector, 22.8% were employees in the non-medical sector, 14.8% were either unemployed or retired. Almost half of the participants were students (47.4%). Participants' monthly income varied widely, 7.3% have less than 250 Jordanian dinars (JoD) while 13.5% have more than 1000 JoD. Some of the students who participated in the survey have part-time jobs, so they answered the profession as students, but they do have monthly income making the percentage of unemployed/student in this section to drop to 45.1%.

Sixty percent of the participants have medical insurance, and more than 90% did not have chronic diseases. The detailed demo-

Table 1
Demographic characteristics of the study participants (n = 386).

Parameter	Mean (SD)	n (%)
Age (mean ± SD)	29.35 (11.90)	
Gender, n (%)		
Female		281 (72.8)
Male		105 (27.2)
Marital status, n (%)		
Single		249 (64.5)
Married		122 (31.6)
Divorced		10 (2.6)
Widowed		5 (1.3)
Smoker, n (%)		
No		267 (69.2)
Yes		119 (30.8)
Nationality, n (%)		
Jordanian		311 (80.6)
Arab Nationality		67 (17.4)
Non-Arab nationality		8 (2.1)
Educational level, n (%)		
High School		20 (5.2)
Diploma		25 (6.5)
Bachelor's degree		282 (73.1)
Postgraduate degree (Master's or Ph.D.)		55 (14.2)
I did not complete my education		4 (1.0)
Living place, n (%)		
Middle of Jordan		286 (74.1)
Northern Jordan		45 (11.7)
Eastern Jordan		43 (11.1)
Southern Jordan		12 (3.1)
Profession, n (%)		
Working in the medical sector		58 (15.0)
Working in non-medical sector		88 (22.8)
Retired		20 (5.2)
Unemployed		37 (9.6)
Student		183 (47.4)
Monthly income (in Jordanian dinar), n (%)		
<250 JoD		28 (7.3)
250–499 JoD		76 (19.7)
500–749 JoD		30 (7.8)
750–999 JoD		26 (6.7)
≥1000 JoD		52 (13.5)
Unemployed/student		174 (45.1)
Medical insurance, n (%)		
Yes		234 (60.6)
No		152 (39.4)
Have chronic disease(s), n (%)		
Yes		36 (9.3)
No		350 (90.7)

graphics characteristics of the study participants are shown in Table 1.

3.2. Medications and supplements used during the second wave of COVID-19

More than 70% of the participants used vitamin C and D, as well as pain relievers such as paracetamol. Around one-third of the par-

Table 2
Medications and supplements used during the second wave of COVID-19.

Medication/dietary supplement	n (%)
Vitamin C and Vitamin D	306 (79.3)
Pain relievers (e.g., Paracetamol)	276 (71.5)
Blood Thinners (e.g., Aspirin® or Clexane®)	57 (14.8)
Cortisone	38 (9.8)
Antibiotics (e.g., Azithromycin)	120 (31.1)
Fluoroquinolone Antibiotics (e.g., Ciprofloxacin or Levofloxacin)	34 (8.8)
Hydroxychloroquine	10 (2.6)
Antivirals	30 (7.8)
Cough medicines	127 (32.9)
Lozenges (e.g., Strepsils®)	161 (41.7)

ticipants reported using Lozenges, cough medicines, and antibiotics. The percentages of the participants that used each medicine/dietary supplement are demonstrated in Table 2.

3.3. Herbs and natural products during the second wave of COVID-19

The prevalence of using natural products was high before the pandemic as between 50% and 70% of the population reported the use of such products (Abdel-Qader et al., 2020, Thiab et al., 2021). In this study, similar results were obtained with more than half of the participants reported the use of one or more natural products. The most used natural products during the second wave of the pandemic among the participants were citrus fruits (78.8%), honey (63.0%) ginger (53.1%), cinnamon (35.0%), star anise (32.1%) and clove (27.5%). The percentages of the participants that used each herb or natural product are demonstrated in Table 3.

3.4. Source of information regarding the medications, dietary supplements, herbs and natural products

The participants reported that family and friends (55.4%) played a major role in advising and encouraging them to use medications and dietary supplements for the purpose of preventing or curing a COVID-19 infection. Pharmacists ranked second (54.1%), followed by social media platforms (43.3%).

Likewise, regarding using herbs/natural products, family and friends ranked first in advising the participants to take them (63.0%), followed by social media platforms (52.3%), and then pharmacists (31.3%) as shown in Table 4.

3.5. Perception of symptoms improvement after using medications, supplements, herbs and natural products during COVID-19 infection

About 40% of the participants (n = 150) documented that they got infected with coronavirus. Table 5 demonstrates the percentages of the participants who documented that their symptoms

Table 3
Herbs and natural products used during the second wave of COVID-19.

Herb/natural product	n (%)
Ginger	205 (53.1)
Citrus fruits	304 (78.8)
Clove	106 (27.5)
Cinnamon	135 (35.0)
Honey	243 (63.0)
Indian premium	35 (9.1)
Artemisia	19 (4.9)
Star anise	124 (32.1)
Caraway	34 (8.8)
Black cumin	66 (17.1)
Propolis	32 (8.3)

Table 4
Source of information regarding the use of medications, dietary supplements, herbs and natural products.

Source	Medication/dietary supplement n (%)	Herb/natural product n (%)
Doctors	161 (41.7)	79 (20.5)
Pharmacists	209 (54.1)	121 (31.3)
Nurses	32 (8.3)	20 (5.2)
Family and friends	214 (55.4)	243 (63.0)
Social media	167 (43.3)	202 (52.3)
Television	104 (26.9)	93 (24.1)
Medical journals	106 (27.5)	102 (26.4)

Table 5
Perception of symptom improvement after using medications, supplements, herbs and natural products.

Symptom	Symptom relieved		
	Yes n (%)	No n (%)	Did not have that symptom n (%)
Medicines and dietary supplements			
Fever and chills	99 (66.0)	10 (6.7)	41 (27.3)
Cough	81 (54.0)	28 (18.7)	41 (27.3)
Shortness or difficulty in breathing	47(31.3)	33 (22.0)	70 (46.7)
Fatigue and tiredness	98 (65.3)	41 (27.3)	11 (7.4)
Joint and muscle pain	96 (64.0)	33 (22.0)	21 (14.0)
headache	110 (73.3)	21 (14.0)	19 (12.7)
Loss or change in taste and smell	56 (37.3)	56 (37.3)	38 (25.4)
Sore throat	73 (48.7)	29 (19.3)	48 (32.0)
Nasal congestion or runny nose	77 (51.3)	25 (16.7)	48 (32.0)
Nausea and vomiting	32 (21.3)	36 (24.0)	82 (54.7)
Diarrhea	32 (21.3)	39 (26.0)	79 (52.7)
Eye pain	34 (22.6)	40 (26.7)	76 (50.7)
Herbs and natural products			
Fever and chills	58 (38.7)	56 (37.3)	36 (24.0)
Cough	80 (53.3)	26 (17.3)	44 (29.4)
Shortness or difficulty in breathing	42 (28)	41 (27.3)	67 (44.7)
Fatigue and tiredness	67 (44.7)	69 (46.0)	14 (9.3)
Joint and muscle pain	58 (38.7)	66 (44.0)	26 (17.3)
headache	56 (37.3)	70 (46.7)	24 (16.0)
Loss or change in taste and smell	42 (28.0)	70 (46.7)	38 (25.3)
Sore throat	64 (42.7)	38 (25.3)	48 (32.0)
Nasal congestion or runny nose	57 (38.0)	42 (28.0)	51 (34.0)
Nausea and vomiting	27 (18.0)	45 (30.0)	78 (52.0)
Diarrhea	28 (18.7)	47 (31.3)	75 (50.0)
Eye pain	17 (11.3)	52 (34.7)	81 (54.0)

were relieved after using medications, dietary supplements, herbs and natural products.

Multiple logistic regression analysis of factors affecting medication use among study participants highlighted that age significantly affected medications and supplements use during the COVID-19 pandemic; the same results were found regarding the use of herbs and natural products as demonstrated in Table 6.

4. Discussion

This study is the first to assess the use of medications and natural products in Jordan, which can help policymakers in providing suitable educational campaigns to increase population knowledge and awareness about the use of medications, dietary supplements, herbs and natural products, particularly during the COVID-19 pandemic.

Regarding medications and dietary supplements, the study revealed that more than 70% of the participants used vitamin C, vitamin D and pain relievers. Analgesics are reported to be one of the most commonly self-prescribed medications, many of which are OTC drugs that are easily obtained, and the same applies to vitamins (Malik et al., 2020). Although there is limited proven therapeutic evidence of the efficiency of vitamins in the treatment of COVID-19, these products became popular among people due to the spread of clinical reports highlighting the role of vitamins in fighting infections including COVID-19 (Jovic et al., 2020, Junaid et al., 2021). Similar findings were reported in Peru (Quispe-Canari et al., 2021), Bangladesh (Ahmed et al., 2020) and Nigeria (Wegbom et al., 2021). In case of the use of herbs and natural products, 92.75% of the participants reported using at least one herb or a natural product, which shows the high prevalence of herbal use in Jordan as was reported in cross-sectional studies conducted in 2020 (Abdel-Qader et al., 2020, Thiab et al., 2021). In this study,

Table 6

Assessment of factors affecting medications, supplements, herbs and natural products used during COVID-19 pandemic study participants (n = 386).

Parameter	Medications use [0: No, 1: Yes]			
	OR	P-value[#]	OR	P-value[$]
Age	1.030	**0.003**	1.027	**0.008**[*]
Gender				
• Male	Reference			
• Female	1.915	**0.037**	1.572	0.167
Educational level				
• Less than bachelor's degree	Reference			
• Bachelor's degree or above	0.644	**0.200**	0.708	0.345
Profession				
• Working in a non-medical sector	Reference			
• Working in medical sector	0.944	0.870	———	———
Smoker				
• No	Reference			
• Yes	0.554	**0.044**	0.602	0.099
Chronic disease(s)				
• No	Reference			
• Yes	1.459	0.338	———	———
	Herbs use [0: No, 1: Yes]			
	OR	P-value[#]	OR	P-value[$]
Age	1.028	**0.002**	1.025	**0.015**[*]
Gender				
• Male	Reference			
• Female	1.539	**0.105**	1.380	0.237
Educational level				
• Less than bachelor's degree	Reference			
• Bachelor's degree or above	0.493	**0.024**	0.623	0.160
Profession				
• Working in a non-medical sector	Reference			
• Working in medical sector	1.231	0.496	———	———
Smoker				
• No	Reference			
• Yes		0.909	———	———
	1.028			
Chronic disease(s)				
• No	Reference			
• Yes	1.863	**0.083**	0.878	1.069

[#] Using simple logistic regression,
[$] Using multiple logistic regression,
[*] Significant at 0.05 significance level.

more than half of the participants used citrus fruits, honey, and ginger. Citrus fruits including oranges, mandarins and grapefruits are cultivated in Jordan and are known to contain vitamin C, which makes them an accessible natural source for vitamin C (Bayer 2021). Ginger was the most cited in a study conducted in Nepal about medicinal plants used to prevent COVID-19 (Khadka et al., 2021). Ginger and honey were also used by more than 50% of participants in a similar study conducted in Bangladesh (Ahmed et al., 2020). Honey, lemon, and ginger were amongst the most used natural products in Saudi Arabia as a protective measure during the COVID-19 pandemic (Abdullah Alotiby and Naif Al-Harbi 2021, AlNajrany et al., 2021). In Vietnam, ginger, honey and garlic were the most commonly used for the treatment of sore throat, cough, nasal congestion, and fever (Nguyen et al., 2021). All these mentioned natural products were reported to have antiviral activity (Parham et al., 2020), which might be a reason for their popularity during COVID-19 pandemic.

Family, friends, and social media had an important role in influencing the participants' choice of medications, supplements, herbs and natural products. Similar influence was observed in Saudi Arabia (Abdullah Alotiby and Naif Al-Harbi 2021), Bangladesh (Ahmed et al., 2020) and Nigeria (Wegbom et al., 2021). The influence of

social media in proposing a type of product to prevent or treat COVID-19 has increased although these platforms are not a reliable source of health information (Goel and Gupta 2020, Mallhi et al., 2020, Nasir et al., 2020, Srivastava et al., 2020, Sadio et al., 2021). Doctors and pharmacists played an active role in the participants' choice of medications and supplements; however, when choosing a herb or a natural product, pharmacists have a role, unlike doctors. Many reasons can help explaining that, starting from the fear of contracting the coronavirus when visiting a medical facility (Mudenda et al., 2020, Nguyen et al., 2021), so visiting doctors can be limited to more serious conditions that require proper medications. Moreover, the ease of accessing community pharmacists can help in getting their advice for both medications and natural products more easily (Basheti et al., 2020, Bukhari et al., 2020, Nguyen et al., 2021).

Because doctors and pharmacists have a lower influence on the choice of natural products, this can lead to increasing the risk of getting herb-drug interactions. For example, ginger, which was found to be one of the most commonly used natural products during the pandemic in Jordan, can increase the risk of bleeding when taken with blood-thinning medications such as warfarin, phenprocoumon, clopidogrel and aspirin (Krüth et al., 2004, Marx et al.,

2015, Rubin et al., 2019). Additionally, citrus fruits and particularly grapefruits, are well known of their interaction with various medications when administered concurrently, including medications that are used to treat overactive bladder syndrome (Paśko et al., 2016), benign prostatic hyperplasia (Paśko et al., 2016) and cardiovascular medications (Harats et al., 1998, Stump et al., 2006).

About 40% of the participants got infected with coronavirus which is close to the estimated percentage of officially reported and unreported cases in Jordan (more than 30%) (Mansour 2021). More than half of the COVID-19 infected participants reported alleviation of headache, fever and chills, cough, fatigue and tiredness, joint and muscle pain, as well as nasal congestion and runny nose after the consumption of medications. On the other hand, only cough was reported by around half of the infected participants to be improved with herbs and natural products. In a cross-sectional survey conducted in Dhaka city, participants reported that they took medications mainly to alleviate fever, dry cough and throat pain (Nasir et al., 2020). In this cross-sectional study only around one-third of the participants reported improvement of sore throat with medications and supplements. Herbs and natural products were reported to be used mainly for sore throat, cough, nasal congestion, and fever in a cross-sectional study conducted in Vietnam, but the participants' perception regarding symptoms improvement was not reported (Nguyen et al., 2021). In other surveys, it was documented that herbs and natural products were used to boost immunity without mentioning specific symptoms (Ahmed et al., 2020, Charan et al., 2020, Abdullah Alotiby and Naif Al-Harbi 2021, AlNajrany et al., 2021, Srikanth et al., 2021).

Regarding the factors that affected the participants' use of medications, supplements, herbs and natural products, only older age was associated with higher use of all the previously mentioned products. Age was the only factor found to increase the prevalence of using herbs and natural products in an online cross-sectional survey conducted in Saudi Arabia (Abdullah Alotiby and Naif Al-Harbi 2021). Additionally, older age was found to be a factor that increased the use of medications and natural products in similar studies conducted in Saudi Arabia (AlNajrany et al., 2021), Bangladesh (Ahmed et al., 2020) and Peru (Quispe-Canari et al., 2021). Unlike this study, other factors were reported in surveys conducted in different countries that influenced the use of medications and natural products including higher education level (Ahmed et al., 2020, Sadio et al., 2021, Wegbom et al., 2021), gender (Ahmed et al., 2020, Sadio et al., 2021, Wegbom et al., 2021), marital status, living region and job status (Nguyen et al., 2021, Quispe-Canari et al., 2021).

4.1. Limitations

The first limitation of this study was patient self-selection, given the survey was conducted online and using social media platforms. Thus, only people who use the Internet and social media were able to participate, although internet services are available in all Jordanian cities.

The second limitation is the representativeness of the sample to the population of Jordan. Females actively participated in this survey more than males. This could be explained by the findings of Abdel-Qader et al, that being female was a predictor for the use of herbal products when compared to males (p = 0.0004). Thus, females were more interested in filling out this survey.

In addition, most of the participants were from the middle of Jordan. However, this provides an opportunity for future studies to focus on observing health behaviours during the pandemic in other parts of the country.

5. Conclusions

Around 93% of the study participants reported the use of at least one medication/supplement and herb/natural products. Vitamins C, D, analgesics, citrus fruits, honey and ginger were the most used substances for preventing or alleviating the symptoms of COVID-19 in Jordan during the second wave. Family and friends, followed by social media platforms, were the main sources of advice regarding the use of these substances. It was noted that pharmacists, compared to other healthcare providers, played a bigger role in advising participants in the choice of both medications and/or natural products. Age was the only factor influencing participants use of medications, supplements, herbs and natural products. Because usually older people can be on prescription medications, and they use herbal products more frequently, awareness campaigns guided by trained healthcare providers to educate people with special focus on the elderly can minimize the risk of side effects that may arise from unsupervised use of natural products concurrently with medications. Even for younger generations, who can be on prescribed drugs for different reasons, will benefit from such campaigns.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contributions

Thiab, HS did the initial research, developed the survey and wrote the methods and discussion. Nassar, N helped in developing the survey, performed the statistical analysis and wrote the results. Thiab, S wrote the introduction and Basheti, I. supervised the study and helped in validating it.

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