



## RESEARCH ARTICLE

# Understanding Behavioral Shifts in Herbal and Natural Remedies (HNRs) and Dietary Supplements Usage during COVID-19 Pandemic: Implications for Healthcare Professionals

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ARTICLE INFO	ABSTRACT
Received: Apr 24, 2024 Accepted: Jul 29, 2024	This study investigated utilization patterns of herbal/natural remedies (HNRs) and dietary supplements among residents of Jordan during the COVID-19 pandemic. Employing a validated questionnaire, a survey was conducted online between March 15 and May 31, 2022. Data analysis was performed using SPSS version 25. The study targeted 553 adults residing in Jordan during the COVID-19 pandemic. The findings revealed that 77.9% of participants consumed HNRs and 74.5% used dietary supplements during the pandemic. Notably, participants reported consuming 41 herbs and 5 supplements. Supplement consumption correlated significantly with medical-field occupation ( $p=0.009$ ), chronic health conditions ( $p=0.038$ ), and COVID-19 contraction ( $p<0.001$ ). Similarly, herbal/natural remedy consumption was associated with factors such as familiarity ( $p<0.001$ ), COVID-19 experience ( $p=0.002$ ), prior herbal remedy use ( $p<0.001$ ), dietary supplement consumption ( $p<0.001$ ), and health-related occupations ( $p=0.002$ ). Commonly used remedies for prevention/treatment included ginger (58.5%, 62.8%), honey (54%, 65.4%), oranges (52.4%, 56%), lemons (46.4%, 52.3%), garlic (44.5%, 41.7%), and onions (44.5%, 45.5%). HNRs were predominantly used for treatment rather than prevention ( $p<0.001$ ), and non-affected COVID-19 participants consumed more of these remedies compared to affected participants ( $p<0.001$ ). The study reveals extensive use of HNRs and dietary supplements by Jordanians during COVID-19. It highlights the prevalence of specific remedies within cultural contexts while advocating for public education on potential risks and evidence-based validation, especially for commonly used herbs. These findings contribute to a nuanced understanding of public health strategies in the context of cultural practices and scientific evidence.
<b>Keywords</b>	
COVID-19 Herb Natural Remedy Supplements Complementary Therapy	

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## INTRODUCTION

Herbal/natural remedies (HNRs) have been employed since ancient times to address diseases and dysfunctions. However, with the widespread production and availability of synthetic medications, the use of HNRs waned. In recent years, there has been a revival of interest in HNRs globally (Alotiby & Al-Harbi, 2021; Villena-Tejada et al., 2021), including in Jordan (Abdel-Qader et al., 2020; El-Dahiyat et al., 2020; Issa & Basheti, 2017). It is claimed that around 75% of people worldwide use herbs for medical purposes (World Health Organization, 2019). The use of HNRs have consistently

proved effective when combined with conventional treatments. As a result, HNRs are readily available in drug stores, grocery stores, and supermarkets worldwide.

The World Health Organization declared COVID-19 a pandemic on 11 March 2021 after it spread rapidly to 118,000 people in 114 countries, resulting in 4,291 deaths (Singh *et al.*, 2021; World Health Organization, 2019). The stated guidelines underline detection, testing, treatment, isolation, tracing, and mobilization of populations as part of comprehensive strategies (Demeke *et al.*, 2021; World Health Organization, 2019). The outbreak surprised the world. Vaccines were not yet available, and new drugs should undergo multiple stages of clinical trials before approval.

Various HNRs and dietary supplements were identified and utilized to strengthen the body's immune system against COVID-19 (Demeke *et al.*, 2021; Hamulka *et al.*, 2021; Onyeaghala *et al.*, 2023; Silveira *et al.*, 2020; Singh *et al.*, 2021; Villena-Tejada *et al.*, 2021). The effects of herbal treatments for pneumonia, colds, coughs, and other respiratory problems have been demonstrated (Silveira *et al.*, 2020). Given that COVID-19 symptoms resemble those of the flu and common cold, Jordanians turned to these familiar remedies for self-treatment. Therefore, HNRs have been overlooked as potential preventative or ameliorative measures against COVID-19 (Asif *et al.*, 2020; Singh *et al.*, 2021; Villena-Tejada *et al.*, 2021; Younis *et al.*, 2021).

This study represents the second attempt to assess the prevalence, attitudes, and practices of HNRs and supplements among Jordanians during the COVID-19 pandemic. The first study, however, had some shortcomings (Younis *et al.*, 2021). The study included 540 Jordanians who used HNRs for COVID-19 prevention or treatment in the first wave of the pandemic. Nevertheless, crucial aspects went unaddressed. As a result of shifting usage patterns, the original study failed to assess participants regarding their usage of HNRs before the pandemic. It was not clear whether participants had to recall all 17 types of HNRs or select from a predefined list. It was not explained how these herbs were selected. Participants who did not use HNRs during the pandemic were excluded, potentially skewing the results. Translation into Arabic was undertaken, but validation was not performed. Discrepancies between the reported results and the statistical tables presented necessitated cautious interpretation.

Another relevant study was published during data collection (Thiab *et al.*, 2022). During the COVID-19 pandemic, 386 Jordanians completed a validated online questionnaire exploring their medication, supplements, and HNR usage. The data collection took place during the second wave. Eleven HNRs and ten medications/supplements were listed. The herbal remedies were sourced from an article published by Al Jazeera newspaper on 23 December 2020. Most of the participants (74.1%) live in Amman, the capital. A possible urban-centric bias in the sample is evident in this percentage, which is higher than the capital's population distribution of 42%.

A previous study in Jordan investigated preventive measures aimed at boosting immunity (Thiab *et al.*, 2022). A survey was conducted anonymously on social media between 1st April and 15th May 2020. A list of 27 herbal remedies, 26 food items, and various supplements encompassing minerals and vitamins was presented to participants in Jordan and the Middle East region. HNR consumption before the pandemic was not assessed in the study. A possible association between HNR consumption and infection likelihood was not explored in the research. In this study, 83% of the participants were from two major cities, Amman and Irbid, the latter of which is a northern city.

This study examines the potential use of HNRs and supplements as a preventative and supportive measure against COVID-19 spread and mortality. From the declaration to the fourth wave of the COVID-19 pandemic, this study explores attitudes and practices regarding HNR and supplement use throughout the pandemic. In addition, it examines the specific HNRs consumed, the parts used, the sources of these remedies, information sources, perceived effectiveness, and factors influencing their consumption.

## RESEARCH METHOD

### Study design

A cross-sectional online survey was conducted among adult Jordanians. Participants must be 18 years or older and proficient in Arabic. Those residing outside Jordan or unwilling to participate were excluded.

### Sample size

Sample size was determined by Cochran formula (Uakarn, 2021). Jordan has 6.420465 million adults (DOS, 2020). It is estimated that 70% of the adult Jordanian population consumes HNRs with a precision of 5% and a confidence level of 95%. The sample size was augmented to 500 to enhance generalizability and investigate COVID-19 and HNR consumption.

### Measurement tool

The questionnaire was designed based on published surveys and reviews (Alotiby & Al-Harbi, 2021; Ang *et al.*, 2020; Demeke *et al.*, 2021; El Alami *et al.*, 2020; Hamulka *et al.*, 2021; Luo *et al.*, 2020; Musoke *et al.*, 2021; Nguyen *et al.*, 2021; Randeepraj *et al.*, 2020; Silveira *et al.*, 2020; Singh *et al.*, 2021; Villena-Tejada *et al.*, 2021). For the questionnaire, HNRs were selected based on international use for treating and preventing COVID-19, easy availability, and traditional use among Jordanians. Besides literature research, five herbalists and twenty Jordanians were interviewed about herbs commonly used there.

The primary investigator prepared the questionnaire in English. The questionnaire was translated into Arabic by two bilingual Ph.D. holders. Both versions were translated back into English to ensure accuracy. Consistency was validated in both versions. Ten academic experts and ten non-academics were piloted for face validity. Their feedback was incorporated into the questionnaire. Microsoft Office Forms was used to create the questionnaire. Further testing was conducted with Ph.D. holders. Based on their feedback, certain question branches were adjusted. An additional ten participants completed a modified online survey, which was not analyzed. An internal consistency test was performed using Cronbach's alpha coefficient, with a result of 0.898.

The final questionnaire had three sections. In the first section, demographic, socioeconomic, and health-related characteristics were collected (Table 1). In the second section, participants were asked about their familiarity with HNRs, historical use trends, and use or non-use of HNRs and supplements. In the third section, HNR consumers were surveyed. A total of 35 HNRs and supplements were listed. Aside from choosing HNRs for COVID-19 prevention and treatment, they could submit additional remedies. Sources of information about HNRs, sources of HNRs, parts used, preparation methods, and consumption habits were examined. A 0-10 visual analog scale was used to rate the remedies' perceived effectiveness.

### Data collection procedure

This study complies with relevant ethical guidelines, including the Helsinki Declaration of 1975. The faculty's department dean at the University of Jordan/Aqaba campus approved the proposal via email on March 24, 2022, based on university branch policy. Final approval was communicated by formal email from the university. Participants were recruited through Facebook, WhatsApp, Messenger, and Instagram. A link to the online survey was included in the introductory statement, along with the study's purpose. Participants were informed that participation was voluntary. Additionally, participants were encouraged to share the survey link. The survey required participants to confirm their consent electronically. The questionnaire began once participants consented. In the case of refusal, the survey would automatically end.

## Statistical analysis

A statistical analysis was performed using SPSS® version 25. Bivariate and descriptive statistics were used. Descriptive statistics summarize frequencies, percentages, means, and standard deviations. Socio-demographic factors and HNR use were assessed using Pearson chi-square test. A paired sample t-test was used to determine whether HNR consumption had changed significantly among COVID-19 participants. Statistical significance was determined by a p-value less than 0.05.

## RESULTS

During the pandemic, 582 individuals were recruited. Eleven declined, while 18 were abroad. A total of 553 participants (95%) were included in the analysis. Participants' sociodemographic and health-related characteristics are shown in Table 1. Participant usage of HNRs varied before the COVID-19 pandemic. 94.2% of respondents were familiar with HNRs. The use of these remedies before the pandemic correlated significantly with age ( $p < 0.001$ ) and familiarity with herbal remedies ( $p < 0.001$ ).

During COVID-19, 431 participants (77.3%) used HNRs. HNRs were used for various reasons (Figure 1). The consumption of HNRs during the pandemic was significantly associated with participants' HNRs familiarity ( $p < 0.001$ ), suffering from COVID-19 ( $p = 0.002$ ), medically confirmed diagnosis of COVID-19 ( $p < 0.001$ ), prior consumption trend ( $p < 0.001$ ), supplement consumption ( $p < 0.001$ ), and health-related occupations ( $p = 0.002$ ). 122 participants (22.1%) chose not to use HNRs for a variety of reasons (Figure 2). A total of 412 (74.5%) participants consumed dietary supplements (Figure 3). Health Supplement consumption was associated with medical occupations ( $p = 0.009$ ), chronic illnesses ( $p = 0.038$ ), and COVID-19 history ( $p = 0.001$ ).

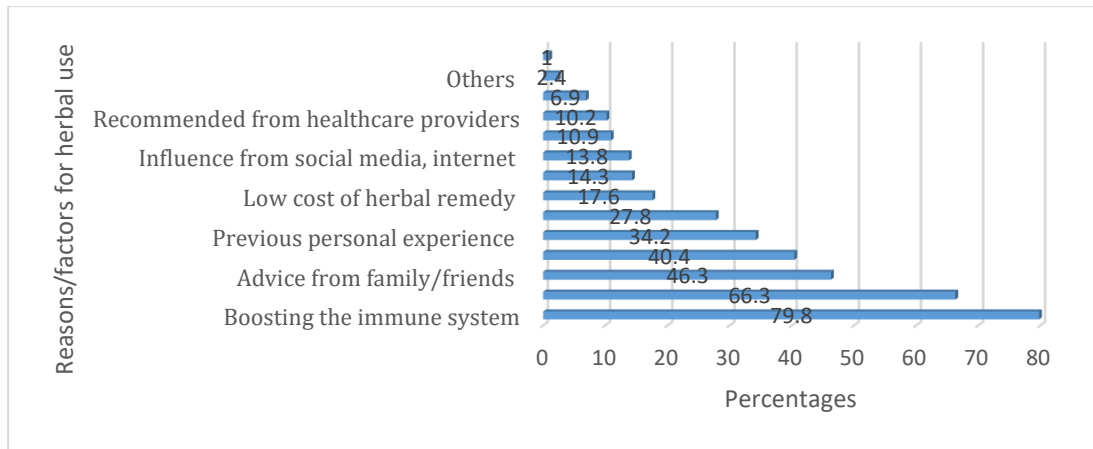
**Table 1: Socio-demographic and health-related characteristics and factors associated with herbal/natural remedies uses among participants (n=553)**

Item	Category	Total, n (%)	User, n (%)	Non-users, n (%)	X2	p-value
Gender	Female	402 (72.7)	315 (73.1)	87 (71.3)	.151	.696
	Male	151 (27.3)	116 (26.9)	35 (28.7)		
Age group, year	18-25	132 (23.9)	98 (22.7)	34 (27.9)	.091	.465
	26-35	123 (22.2)	93 (21.6)	30 (24.6)		
	36-45	159 (28.8)	127 (29.5)	32 (26.2)		
	46-55	118 (21.3)	95 (22)	23 (18.9)		
	56-65	19 (3.4)	17 (3.9)	2 (1.6)		
	>65	2 (0.4)	1 (0.2)	1 (0.8)		
Marital status	Single	178 (32.2)	135 (31.3)	43 (35.2)	.096	.164
	Married	352 (63.7)	278 (64.5)	74 (60.7)		
	Divorced	14 (2.5)	13 (3)	1 (0.8)		
	Widowed	9 (1.6)	5 (1.2)	4 (3.3)		
Nationality	Jordanian	546 (98.7)	426 (98.8)	120 (98.4)	.069	.615
	Palestinian	4 (0.7)	2 (0.5)	2 (1.6)		
	Syrian	1 (0.2)	1 (0.2)	0 (0)		

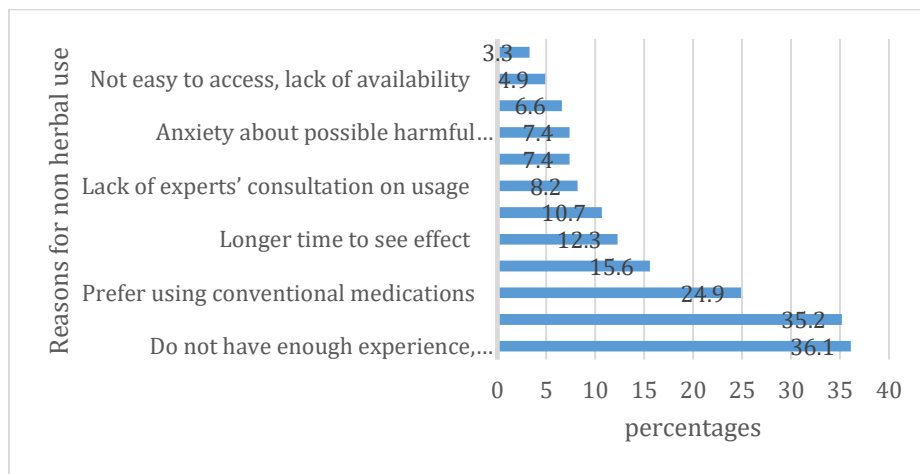
Item	Category	Total, n (%)	User, n (%)	Non-users, n (%)	X2	p-value
	Egyptian	1 (0.2)	1 (0.2)	0 (0)		
	Iraqi	1 (0.2)	1 (0.2)	1 (0.2)		
Region	Northern	220 (39.8)	167 (38.7)	53 (43.4)	3.05	.218
	Central	119 (21.5)	89 (20.6)	30 (24.6)		
	Southern	214 (38.7)	175 (40.6)	39 (32)		
Community type (urbanity)	rural	362 (65.5)	279 (64.7)	83 (68.0)	.091	.205
	suburban	69 (12.5)	57 (13.2)	12 (9.8)		
	urban	119 (21.5)	94 (21.8)	25 (20.5)		
	Al Badia	3 (0.5)	1 (0.2)	2 (1.6)		
Education	Primary (Grade 1-6)	2 (0.4)	2 (0.5)	0 (0)	.089	.494
	Secondary (Grade 7-9)	8 (1.4)	6 (1.4)	2 (1.6)		
	Tertiary (Grade 10-12)	66 (11.9)	46 (10.7)	20 (16.4)		
	College	79 (14.3)	62 (14.4)	17 (13.9)		
	undergraduate	294 (53.2)	236 (54.8)	58 (47.5)		
	Postgraduate	104 (18.8)	79 (18.3)	25 (20.5)		
Occupation category	unemployed	36 (6.5)	26 (6)	10 (8.2)	.094	.557
	Housewife	76 (13.7)	55 (12.8)	21 (17.2)		
	Student	93 (16.8)	70 (16.2)	23 (18.9)		
	Self-employed	13 (2.4)	9 (2.1)	4 (3.3)		
	private sector	71 (12.8)	58 (13.5)	13 (10.7)		
	public sector	245 (44.3)	197 (45.7)	48 (39.3)		
	Retired	19 (3.4)	16 (3.7)	3 (2.5)		
Monthly income (n=517)	< 250 JD	89 (17.2)	64 (16)	25 (21.6)	5.639	.343
	251-450 JD	156 (30.2)	120 (29.9)	36 (31)		
	451-650 JD	128 (24.8)	99 (24.7)	29 (25)		
	651-850 JD	58 (11.2)	51 (12.7)	7 (6)		
	851-1000 JD	37 (7.2)	30 (7.5)	7 (6)		
	> 1000 JD	49 (8.9)				

Item	Category	Total, n (%)	User, n (%)	Non-users, n (%)	X <sup>2</sup>	p-value
	Missing	36 (6.5)				
Health-related job	Yes	187 (33.8)	160 (37.1)	27 (22.1)	9.549	.002
	No	366 (66.2)	271 (62.9)	95 (77.9)		(Eta=0.131)
Chronic disease	Yes	94 (17)	79 (18.3)	15 (12.3)	2.454	.117
	No	459 (83)	352 (81.7)	107 (87.7)		
Health status perception	Poor	5 (0.9)	3 (0.7)	2 (1.6)	.105	.189
	Fair	51 (9.2)	36 (8.4)	15 (12.3)		
	Good	153 (27.7)	113 (26.2)	40 (32.8)		
	Very good	239 (43.2)	195 (45.2)	44 (36.1)		
	Excellent	105 (19.0)	84 (19.5)	21 (17.2)		
Suffered from COVID-19	No	207 (37.4)	147 (34.1)	60 (49.2)	9.225	.002
	Yes	346 (62.6)	284 (65.9)	62 (50.8)		(Eta=.129)
Pre pandemic use trends	daily	97 (17.5)	90 (20.9)	7 (5.7)	95.77	.000
	weekly	138 (25.0)	126 (29.2)	12 (8.7)		(Eta=0.416)
	monthly	114 (20.6)	94 (21.8)	20 (16.4)		
	rarely	181 (32.7)	117 (27.1)	64 (52.5)		
	do not use	23 (4.2)	4 (0.9)	19 (15.6)		
Familiarity	Not Familiar at all	32 (5.8)	11 (2.6)	21 (17.2)	55.29	.000
	Slightly familiar	323 (58.4)	241 (55.9)	82 (67.2)		(Eta=0.316)
	Very familiar	198 (35.8)	179 (41.5)	19 (15.6)		
supplements use during the pandemic	Yes	412 (74.5)	338 (78.4)	74 (60.7)	15.8	.000
	No	141 (25.5)	93 (21.6)	48 (39.3)		(Eta=.169)

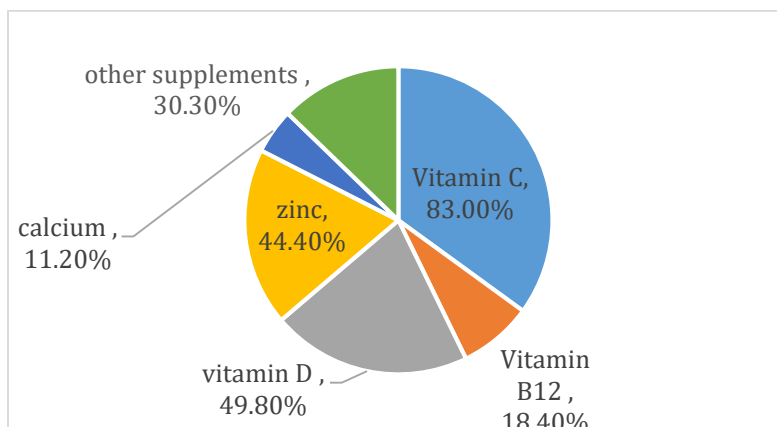
Source: Prepared by the researchers based on the field study data using SPSS 2025



**Figure 1: Reasons (percentages) for use of herbal/natural remedies during the covid-19 pandemic among users (n = 421; 1565 responses)**



**Figure 2: Reasons (percentage) for not using herbal/natural remedies during the covid-19 pandemic among the non-users (n=122; 210 responses)**

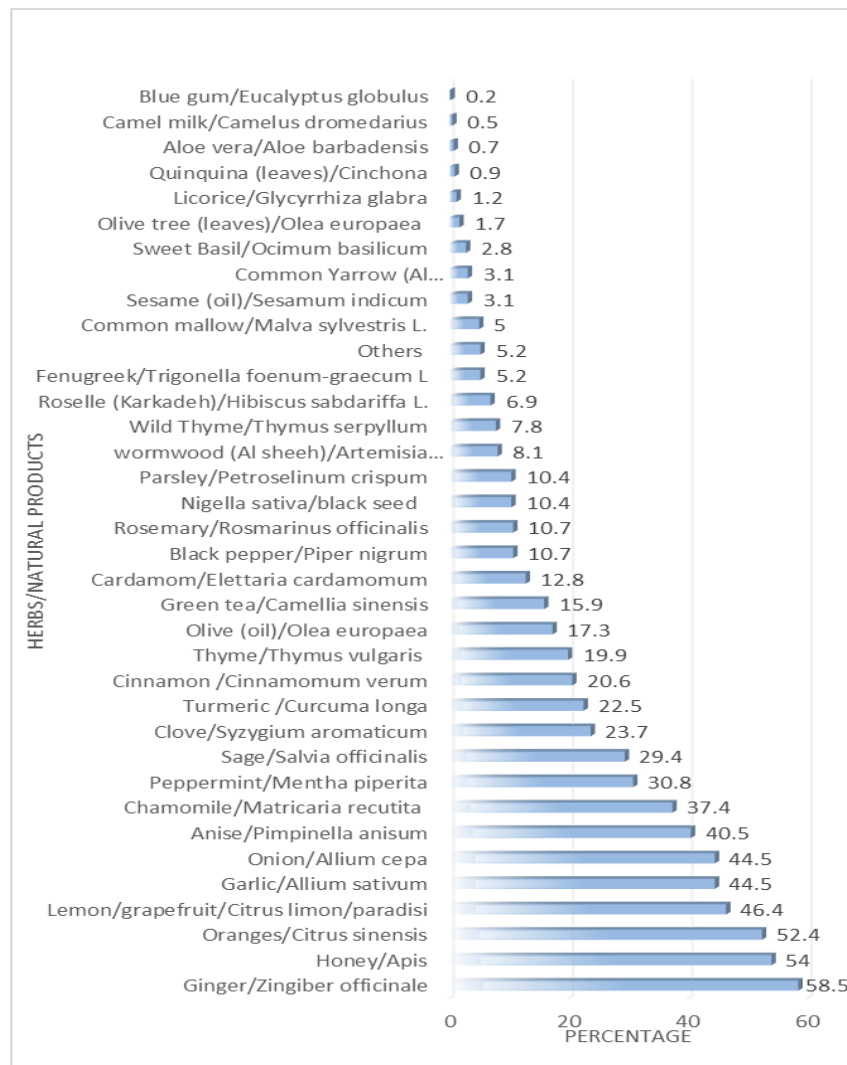


**Figure 3: Supplements used during covid-19 pandemic (n=412; 977 responses)**

Participants consumed 39 HNRs to prevent COVID-19 (Figure 4) and consumed nearly the same HNRs during the COVID-19 treatment (Figure 5). In addition, 7 participants consumed Indian costuss

(i.e. *Dolomiaea costus*, *Saussurea costus*), and 1 participant consumed *Cassia Angustifolia*/*Cassia Senna*. The most commonly consumed HNRS for COVID-19 (prevention/treatment) were ginger (58.5%, 62.8%), honey (54%, 65.4%), oranges (52.4%, 56%), lemon (46.4%, 52.3%), garlic (44.5%, 41.7%), onion (44.5%, 45.3%), anise (40.5%, 50%), and chamomile (37.5%, 54.1%).

Participants evaluated HNRS using a 0-10 visual analog scale (VAS). Satisfaction was 7.34 (SD=1.84). To compare satisfaction levels regarding HNR consumption between non-COVID-19 and COVID-19 participants, an independent sample t-test was conducted. Participants who were not affected by COVID-19 ( $M = 7.69$ ,  $SD = 1.76$ ) were significantly more satisfied than those who were affected ( $M = 7.16$ ,  $SD = 1.85$ );  $t(410) = 2.79$ ,  $p = 0.005$ . Seeds and leaves were the most commonly used parts. A variety of sources were used by participants who consumed HNRS for prevention or treatment of COVID-19 (Table 2). In addition, HNR sources and preparation methods varied (Table 2).



**Figure 4: Herbs/natural remedies used for covid-19 prevention**



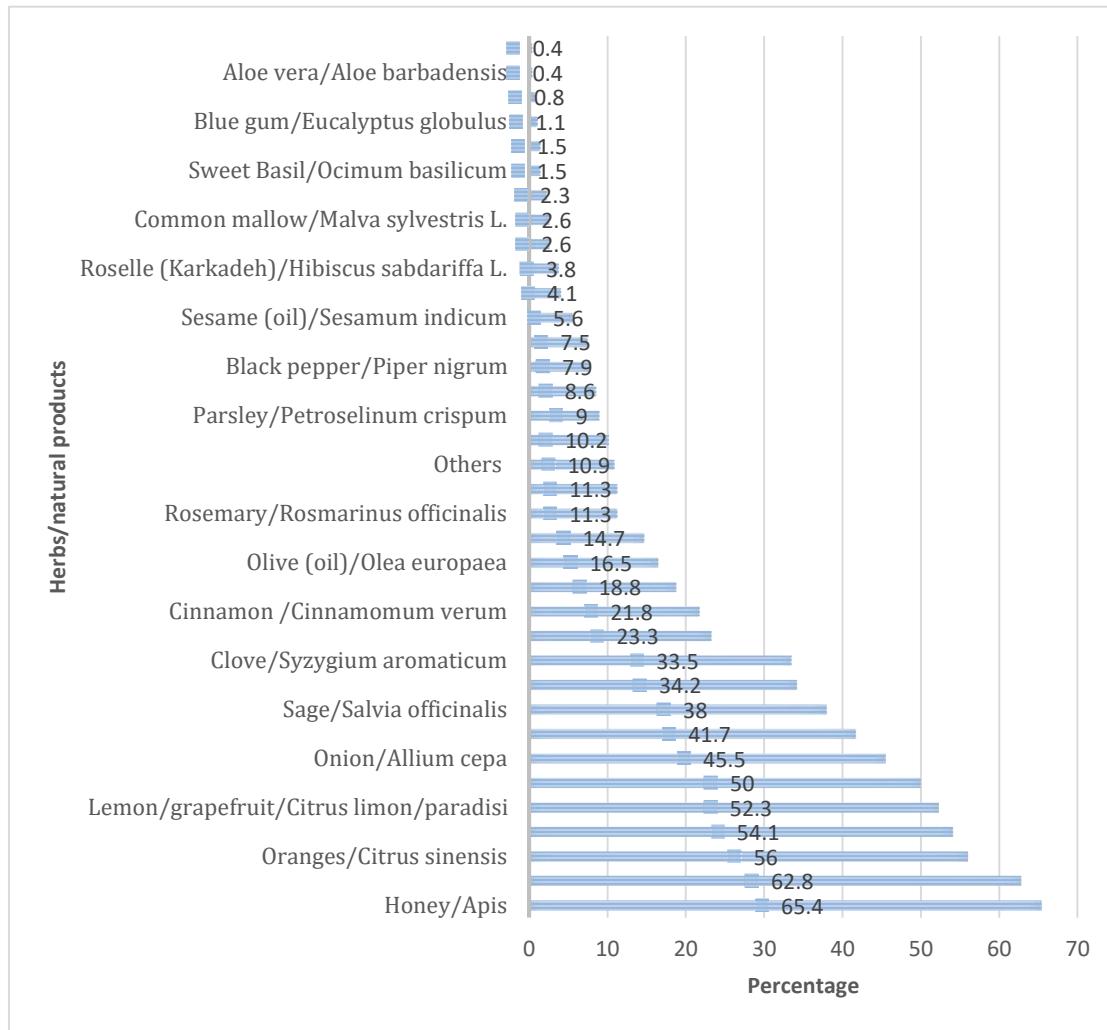


Figure (5): Herbs/Natural Remedies Used for COVID-19 Treatment

Table 2: Utilization of herbal/natural products by users (n=431)

Item	Category	Frequency	Percentages
Use herb for	Prevention	163	37.3
	Prevention and treatment	268	62.2
Used plant part	leaves	338	34.3
	seeds	210	21.3
	flowers	130	13.2
	fruit	170	17.3
	roots	55	5.6
	whole plant	82	8.3
Preparation methods	Infused with hot water	395	35%
	Soaked in cold water	19	2%
	Added to the food	122	11%
	Inhalation	183	16%

	Aromatherapy	59	5%
	Boiling and then drink it warm	120	11%
	combination of more than 3 herbs	84	7%
	Taking herbs in pairs	45	4%
	Taking each one as single herb	106	9%
Information sources	Books	124	11.6
	Family/parents/Grands	284	26.7
	Friends	84	7.9
	HCPs	69	6.5
	Herbalists	62	5.8
	Nutritionist	32	3
	Education	62	5.8
	Media/Internet	176	16.5
	Trial/Error	172	16.2
Herb/natural remedies resources	Family/Friend	161	19%
	Available at home garden	154	18%
	Internet	16	2%
	Herbalists	289	34%
	Market/Supermarkets	170	20%
	Health food stores	17	2%
	Pharmacy	40	5%

Source: Prepared by the researchers based on the field study data using SPSS 2025

## DISCUSSION

This study offers valuable insights into HNRs utilization and perceptions during the COVID-19 pandemic. Jordanians deeply value HNRs in their cooking and medicine (Abdel-Qader et al., 2020; El-Dahiyat et al., 2020). Most participants had experience with HNRs before the pandemic, and a large proportion (77.9%) continued to use them during the pandemic (Alotiby & Al-Harbi, 2021; Thiab et al., 2022; Villena-Tejada et al., 2021). However, herbal use in Jordan was significantly higher than in Vietnam and Uganda (Musoke et al., 2021; Nguyen et al., 2021). In particular, herbal remedies are perceived as effective for treating and preventing COVID-19. A lack of clinical evidence for newly developed vaccines could also have contributed to intensive usage. Most participants in this study were familiar with herbal remedies, in line with a recent study in Jordan conducted during the pandemic (El-Dahiyat et al., 2020). In line with previous research, non-users report that they lack experience and perception of good health (Villena-Tejada et al., 2021). A lack of awareness of risks may lead to nonusers' preference for conventional methods instead of HNR. Consequently, over-the-counter respiratory treatments, including diet supplements, may be misused.

In contrast to a recent Jordanian study, this study found no correlation between HNR consumption and age, gender, or chronic illnesses (El-Dahiyat et al., 2020). It is often considered safe and easy to access HNRs, attracting individuals from diverse backgrounds. For HNRs, cultural and traditional significance transcends demographics. Moreover, HNRs can be viewed as proactive health measures for improving immunity and overall health during the pandemic. Most participants in this study did not report chronic conditions, contributing to the lack of a correlation with HNRs.

The results of this study reveal intriguing associations between supplement consumption, the COVID-19 pandemic, and the use of HNRS. Numerous factors were statistically associated with supplement consumption. The medical field exhibited a higher tendency to consume supplements. Health-related information and increased awareness of dietary supplementation among healthcare professionals could influence occupational exposure to health-related information. This highlights the importance of tailoring health education and intervention strategies to this group. Supplement consumption was also associated with chronic medical conditions. Individuals with underlying health issues may be more inclined to use supplements for overall health maintenance. Providing guidance on supplement use and its potential benefits for chronic conditions to healthcare providers and authorities is highly relevant to this insight. Moreover, individuals who had previously contracted COVID-19 were more likely to take supplements as a precaution or post-recovery measure. During the ongoing pandemic, supplements are perceived to improve immune function.

During the COVID-19 pandemic, many participants reported consuming HNRS. Several factors were associated with this behavior. First, familiarity with these remedies positively correlated with consumption. It indicates the importance of health literacy in shaping health-related behaviors when individuals are informed about HNRS. The use of HNRS was also associated with having experienced COVID-19. Personal experiences with the virus may influence individuals to explore alternative and complementary health approaches. Prior consumption was another significant factor associated with their use during the pandemic, indicating that individuals with pre-existing habits of using HNRS continued to do so. Finally, engagement in health-related occupations is also associated with HNR consumption, possibly due to access to information about alternative therapies and professional knowledge.

The study confirmed prior findings suggesting that ginger, honey, citrus fruits, garlic, onion, anise, and chamomile are popular choices for enhancing immunity, fighting COVID-19, and managing illnesses (Alotiby & Al-Harbi, 2021; El Alami *et al.*, 2020; Musoke *et al.*, 2021; Nguyen *et al.*, 2021; Thiab *et al.*, 2021). It suggests a reliance on traditional remedies often associated with health benefits. According to researchers, these remedies benefit the immune, respiratory, and circulatory systems (El Alami *et al.*, 2020). Traditionally, ginger has been used to treat fevers, coughs, and sore throats because of its anti-inflammatory and antiviral properties (Singh *et al.*, 2021). Traditionally, honey was used for treating viral infections and boosting immunity. Combining it with ginger suppresses productive coughing (Jaybhaye *et al.*, 2022). Inflammation is reduced by chamomile tea (Srivastava *et al.*, 2010). The antiviral properties of garlic may reduce the severity of COVID-19, although clinical validation was hindered by insufficient sample size (Taghavi *et al.*, 2023). Despite their widespread use, there is no scientific evidence that they are effective against COVID-19. Vitamin C and D were also believed to provide essential nutrients and strengthen the immune system. However, healthcare professionals should be consulted before incorporating supplements. Contrary to some previous findings (Hamulka *et al.*, 2021), participants in our study supplemented with vitamin C, vitamin D, and zinc more during the pandemic. Recent studies found a similar increase in supplement usage during the pandemic (Issa *et al.*, 2021; Thiab *et al.*, 2022). There is a possibility that increased awareness about immune health benefits from supplements during the pandemic is contributing to this disparity, as it is disseminated through media, healthcare providers, and social media. There is potential for enhancing the therapeutic effects of herbs by combining them. There is, however, a risk of interactions, emphasizing the need for caution and professional guidance, especially for individuals with health conditions or taking medications. This practice requires a thorough understanding of the properties and possible interactions of each herb.

Participants who were not affected by COVID-19 consumed more HNRS. This inclination may be due to the perception that HNRS possess antiviral properties, potentially enhancing immunity and protecting against viruses. COVID-19-affected individuals used HNRS more often for treatment of COVID-19 symptoms than for prevention. The high use of HNRS for treating COVID-19 symptoms

compared to prevention can be explained by the limited availability of approved treatments, perceived efficacy of these remedies, desperation for relief, information overload, fear and anxiety, cultural beliefs, accessibility, and media. Our results contrast with those of a previous study (Villena-Tejada *et al.*, 2021). COVID-19 diagnosis may have led participants to look for conventional therapies. Based on our study, the Jordanian population may have confidence in certain herbal remedies' effectiveness for symptom relief rather than virus management. It may be an indication of a shift toward traditional remedies for managing symptoms after diagnosis.

Perceived effectiveness was 7.34. In a Jordanian study, 45.5% of participants rated herbal consumption as very effective, and 18.3% as moderately effective (Younis *et al.*, 2021) (14). Among individuals not infected with virus symptoms, herbal remedies were reported to be more satisfying. Those affected by COVID-19 may have felt helpless, believing natural remedies were insufficient. Interestingly, even COVID-19 participants believed in herbs' efficacy, suggesting a better outcome even if the virus isn't fully eradicated.

Plant leaves and seeds were the most popular parts consumed. In this case, anise is a seed, honey is a substance produced by bees, ginger is a stem, and garlic and onion are bulbs. Throughout history, chamomile has been recognized as a flower while oranges and lemons have been categorized as fruits. Natural remedies users need to understand plant anatomy [leaves, stems, roots, flowers, fruits, and seeds]. A primary preparation method was hot water infusions, which successfully extracted valuable compounds. Participants sourced remedies from herbal shops, markets, and gardens. The primary information sources were family and social media, underscoring the role of familial knowledge. This study stresses the importance of structured herbal medicine education, especially for pharmacists. Accordingly, this study highlights traditional remedies and the importance of evidence-based knowledge during the pandemic (Issa & Basheti, 2017).

## **FINDINGS AND RECOMMENDATIONS**

### **Clinical implications**

The widespread use of HNRs and supplements can pose health risks, including unproven efficacy, hazards, adulteration, and overdose risks. Establishing systems for monitoring adverse events, including healthcare professionals as guides, and promoting evidence-based practices are essential to ensure public safety.

### **LIMITATIONS AND RECOMMENDATION FOR FUTURE RESEARCH**

During the COVID-19 pandemic, this study utilized an innovative online survey approach, but it still has limitations: data collection after the initial pandemic wave, no investigation of medicinal plant pharmacological effects, and no distinction between prescription and over-the-counter supplements. Due to COVID-19-related confounding and combined herb use, adverse reactions were not extensively analyzed. Participants had to have access to the internet, possibly excluding older or less technical individuals. Research should examine health impacts and safety profiles, distinguish usage patterns, and rigorously assess adverse drug reactions in the future. Including those with limited digital access, especially the elderly, and monitoring public practices longitudinally will provide valuable insights into evolving trends.

### **CONCLUSION**

Jordanians relied on herbal remedies during COVID-19, rooted in cultural practices. Despite their perceived benefits, it emphasizes the need for evidence-based validation and public education. In addition to treating common ailments, herbal remedies can complement treatment for COVID-19. This study could inform future clinical trials and highlight alternative treatments for viral diseases. Due to potential medication interactions, cautious use is advised. Integrating herbal remedies into healthcare practices effectively requires public education and awareness campaigns. Comparing

their efficacy to conventional treatments requires a holistic approach. A valuable insight for healthcare professionals, policymakers, and researchers is revealed by the study. Further research is needed to deepen understanding of supplement and herbal remedy consumption during COVID-19.

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