

# COVID-19 Effect on Dietary Supplements' Consumption, Prophetic Medicine Practices and Herbs Use in Saudi Arabia

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## Abstract

**Background:** The COVID-19 pandemic influenced dietary supplements' (DS) consumption and practices of traditional medicine.

**Aims:** This cross-sectional study aimed to compare dietary supplements, Prophetic medicine (PM) and herbal/plants (H/P) use among adults in Saudi Arabia before and during the COVID-19 pandemic.

**Method:** 1351 individuals participated in the study via an online survey shared on social media platforms between December 11th, 2021, and March 1st, 2022. The survey tool included 31 questions about sociodemographics, DS consumption, PM practices and H/P use, which the expert panel team validated. The data was analyzed using SPSS version 26. Descriptive statistics were presented as numbers and percentages. P-value  $\leq 0.05$  and 95% confidence intervals were used to report the statistical significance based on gender and prior infection with the COVID-19.

**Results:** The most common supplements consumed before the pandemic were Vitamin D (53.4%, n=358), Multivitamins (47.3%, n= 318), and Vitamin C (42%, n=282). This is along with the significant increase in the

consumption of Multivitamins, Vitamin C, Vitamin B complex, Vitamin D, Zinc and Calcium during the pandemic. Females are significantly ( $p < 0.001$ ) more concerned in consuming DS and H/P and practice PM before and during the COVID-19 pandemic, compared to males. Prior Covid-19 infection significantly impacted individuals' perception about DS, H/P and PM uses and practices, information and beliefs in their role in preventing and controlling the disease ( $p < 0.05$ ). Significant changes in weight status during the pandemic were reported.

**Conclusion:** There was a significant increase in consumption of most dietary supplements and Prophetic medicine practices. The government should launch public awareness campaigns and employ regulations to educate about the risks and benefits of self-medicated Prophetic medicine practices and self-prescribed dietary supplements.

**Keywords:** COVID19, Dietary supplements, Herbs/Plants, Prophetic medicine.

## Background

The new coronavirus pandemic (COVID-19) has negatively impacted the global economy and caused many deaths and health problems. As a result, the world has been desperately trying to find a treatment and prevention for COVID-19. The limited availability of treatment for COVID-19 has triggered public concern, attempting to discover other options to stop the spread of the disease or lessen the infection's progress (1).

## Consumption of Dietary Supplements

A dietary supplement (DS) is defined by the USA's Food and Drug Administration as an ingestible product containing a "dietary component" intended to enhance the diet's nutritional value (2). People consume DS for various reasons depending on age, gender, physical activity or overall health. However, the most common uses are overall health and wellness, illness prevention, and repair of dietary deficiencies (3).

The most frequently reported indication to use vitamins or other DS was for therapeutic reasons and to strengthen the immune system (n = 142/160, 88.8%) (4).

Due to the COVID-19 pandemic, DS sales have significantly increased, and the increase reached 415% in the U. S. in March 2020 (5).

## Practices of Prophetic Medicine and Use of Herbs/Plants

Prophetic medicine (PM) precedes Prophet Muhammad's time alongside other chronological uses of plant products such as Dates, Olives / Olive oil, Figs, Pomegranate and Black seeds were successfully anticipated by him. These foods were used as alimentary interventions to prevent diseases and maintain health and are considered essential parts of treatment in Saudi Arabia (SA)(6).

Despite the reported advantages of using herbal medicines in preventing, treating diseases, or relieving symptoms (7), studies showed that combining herbal medicine and prescribed drugs can lead to life-threatening conditions in some patients (8).

To the best of the authors' knowledge, no previous studies have examined the impact of COVID-19 epidemic on the outcomes DS, PM, H/P, weight status and prior infection. This study aims to research the effect of COVID-19 on the consumption of dietary supplements, use of H/P and practices of PM in SA and compare it with the period prior to the emergence of COVID-19. Another aim is to examine differences in the impact of COVID-19 epidemic using two outcomes: gender and prior infection with COVID-19.

## Methodology

### Study design

This survey-based cross-sectional study was administered online employing the Google Forms web survey platform. The connection to the electronic survey was shared through social media platforms (Twitter, WhatsApp, and Instagram), targeting the adult population (age > 18 years) who live in SA.

### Study Tool and data collection

The survey included questions about the impact of the Covid-19 pandemic on the consumption of DS, the use of H/P, PM practices and weight status.

### Development and validation of the questionnaires

Based on the literature, the research team, who were clinical dietitians and senior medical students, defined the components of the survey and developed the tool in English. Eight members of a bilingual expert panel (EP) were selected for their expertise in the field and the topic of the study. The EP reviewed, edited, and approved the developed tool based on the questionnaire items' relevance, specificity and comprehensiveness. The members of the EP conducted their review conversations through email, online meetings through the Zoom program and onsite meetings in the female section of King Abdulaziz University Medical Center. Afterward, the research team translated the questionnaire into Arabic (the native language) and it was re-sent to the expert panel for their evaluation. Then, another step was taken to back-translate the Arabic version into English. Finally, the expert panel team compared the original English version and the translated version, considering all of the comments provided, to validate the questionnaire.

The survey was tested on 40 adult participants (all of them completed the English version, and only 20 completed both the Arabic and the English versions) to confirm the reliability and validity of the questions. In addition, based on participants' responses, some questions were modified to facilitate understanding of the surveys.

The survey instrument included 31 questions, whereas the first section included sociodemographic data and information concerning the health status of participants. Sociodemographic information included gender, age, social status, educational level and occupation. Responses from participants included their medical profile and family history of chronic diseases prior to COVID-19. Moreover, the effect of COVID-19 on weight status was investigated using weight changes during the pandemic. The second section concentrated on the use of the DS prior to the pandemic, its type, the reason for its use, and whether or not that use was affected by the pandemic. If it was, they were asked to clarify the reason behind that.

The third section investigated PM practices, H/P use prior to the pandemic, the type, the reason and whether or not they were affected during the COVID-19 pandemic. If they were, participants were asked to clarify the reason behind that.

The questionnaire was available online in English and Arabic during data collection, depending on the participants' preferences for a response.

### Study sample and sample size calculation

The Epi Info sample size calculator was used to calculate the required sample size according to the total number of adult population living in the country in 2021–2022.

A total of 1351 participants were included in the study. The inclusion criteria were adults older than 18 who live in SA, and all other responses were excluded from the study.

The research team assured the participants that their survey responses were voluntary and anonymous. Information about the study, including its purpose, the possibility to publish data and the permission given to the authors to use and publish the collected data, was available to the participants before answering questions. Informed consent appeared on the first page of the questionnaire. Respondents had the right to accept or refuse to share their data. The questionnaire was available online from December 11th, 2021, to March 1st, 2022.

### Statistical Analysis

Once completed, each questionnaire was sent to the Google platform, and the final database was downloaded as a Microsoft Excel sheet. The Statistical Package for Social Science (SPSS) version 26 was used to analyse the data (SPSS Inc., Chicago, IL, USA). Frequencies and percentages were used to present descriptive data.

Based on the study, aims were to identify the effect of COVID-19 on different outcomes. To test differences, the McNemar test was used for paired nominal data and Chi-square independence test with the dichotomous dependent variables and more than one independent variable was used to determine differences between variables. Outcomes considered: 1. the gender (male/female) and 2. Infection with COVID 19 (infected/non infected). A P-value of less than 0.05 was defined as statistically significant.

## Results

### Demographics of studied participants

A total of 1351 individuals participated in this study from all over the Kingdom of Saudi Arabia, where the majority were from Makkah Province 644 (47.7%), followed by the Eastern Region 356 (26.4%) and the Riyadh region 166 (12.3%) (Figure 1).

Most respondents were Saudi (89.9%, n=1215) and in the age group 18-29 years old (70%, n=946). More than half of them, 998 (73.9%), were females, and the remaining 353 (26.1%) were males (Table 1).

One-fifth of the participants had chronic diseases, 272 (20.1%). The most prevalent diseases were pulmonary diseases 79 (5.8%), followed by hypertension 72 (5.3%), depression or anxiety 70 (5.2%) and dyslipidemia 67 (5%) (Figure 2a/b).

### Infection with COVID-19, impacts on demographics and weight status

According to the findings, 447 (33.1%) reported a prior COVID-19 infection, and 953 (70.5%) reported a prior COVID-19 infection among their family members. Among participants, 586 (43.4%) reported that their work status was affected or changed due to the COVID-19 pandemic. In terms of weight changes during the pandemic, 521 (38.6%) gained weight and 280 (20.7%) lost weight. Of those who gained weight, 252 (48.3%) gained 3-5 kg, while 125 (44.6%) lost weight by 3-5 kg (Figure 3).

### Consumption of dietary supplements

Half of the participants reported regular intake of DS such as vitamins or minerals; 419 (62.4%) used them as per recommendation by family members and friends, and 354 (52.9%) reported reasons for consuming DS to meet their recommended nutritional needs and 347 (51.8%) for sports and fitness.

The most common supplements consumed before the pandemic were Vitamin D 358 (53.4%), Multivitamins 318 (47.3%) and Vitamin C 282 (42.2%). During the pandemic, the most commonly used were Vitamin C 588 (87.6%), followed by Vitamin D 517 (76.9%) and Multivitamins 468 (69.7%). Compared to the period before the pandemic, there was a significant increase in the usage of Multivitamins, Vitamin C, Vitamin B complex, Vitamin D, Zinc and Calcium (Table 2).

### Participants' perceptions about PM practices and H/P use

Before the pandemic, 714 (52.8%) participants practiced PM and used H/P. The highest use was for the Talbina (porridge with barley, milk, and honey) 634 (46.9%), followed by honey 448 (33.2%), chamomile 435 (32.3%), pomegranate fruit 425 (31.5%), Vinegar 419 (31%) and Figs 409 (30.3%). During the pandemic, the highest consumption continued to be for the Talbina 981 (72.6%), followed by pomegranate fruit 816 (60.3%), honey 611 (45.2%), chamomile 536 (39.6%) and vinegar 519 (38.4%). Compared to the period before the pandemic, there was a significant increase in most PM practices (Table 2).

About half of the participants, 673 (49.8%), believed that people's information and beliefs about PM practices and H/P use had increased during the COVID-19 pandemic. Moreover, 330 (24.4%) believed they could prevent and/or cure COVID-19. Additionally, 276 (20.4%) reported that their practices had increased during the pandemic, while 538 (39.8%) reported no change. The most common reason for the increase in use 198 (71.7%) was to improve their health and nutritional status during COVID-19.

**Associations**

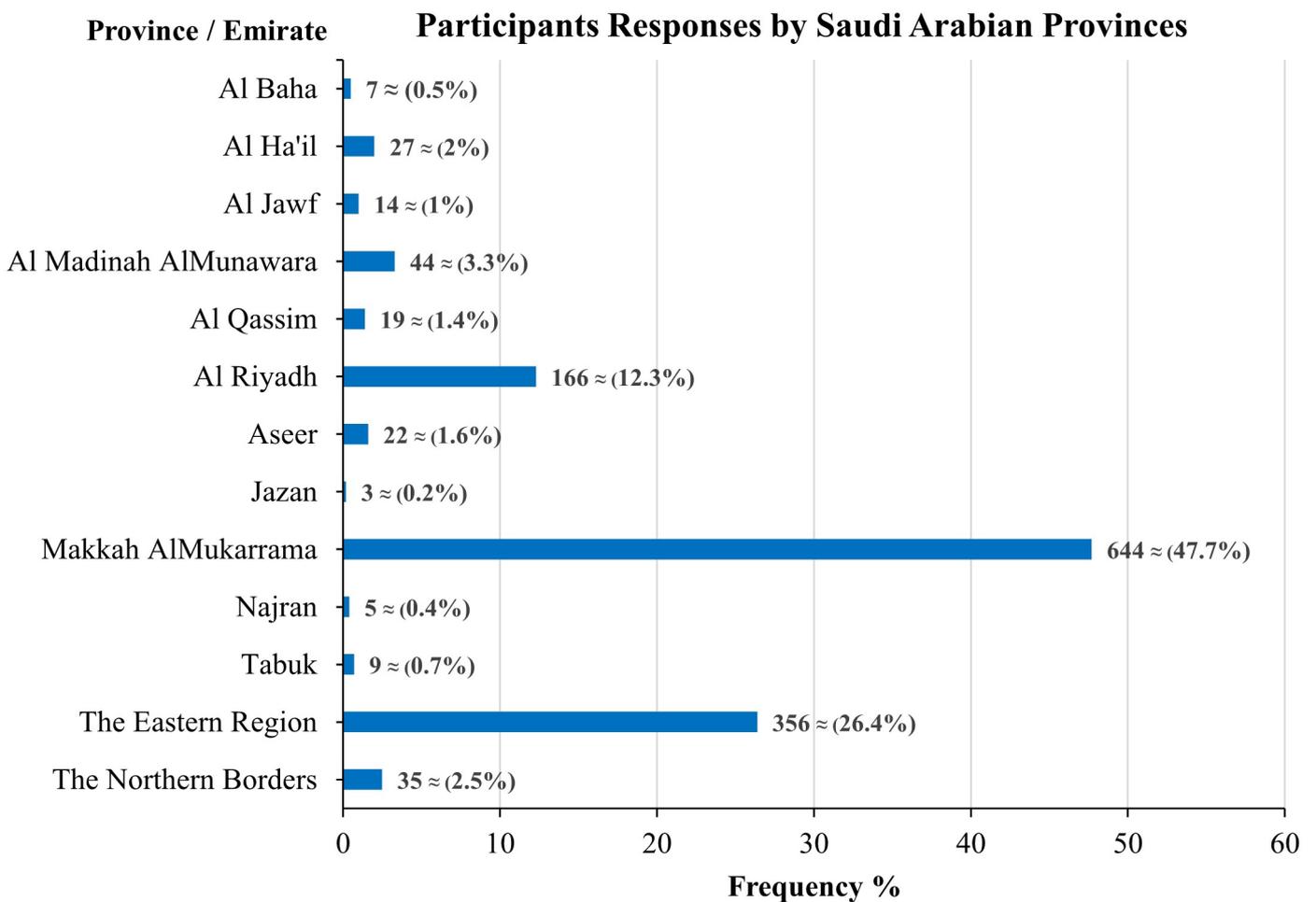
**Gender impact on DS consumption, PM practices, and H/P use.**

In this study, female participants significantly consumed more DS and H/P and practiced more PM before the COVID-19 pandemic than male participants. Moreover, this tendency persisted during the COVID-19 pandemic period ( $p < 0.05$ ) (Table 3).

**Impact of Covid-19 infection on DS consumption, PM practices, and H/P use.**

Participants with a prior history of COVID-19 infection significantly consumed DS, practiced PM, and used H/P less frequently before and during the pandemic ( $p < 0.05$ ) than those previously not infected with COVID-19. They were also less likely to believe that the public's knowledge and beliefs about PM practices and H/P use had increased during the COVID-19 pandemic and to believe in their influential role in preventing or curing the COVID-19 infection ( $p < 0.05$ ) (Table 4).

**Figure 1: Participants' responses by Saudi Arabian provinces**



**Table 1: Distribution of studied participants according to their demographic characteristics (No.:1351)**

<b>DEMOGRAPHIC DISTRIBUTION</b>		
<b>VARIABLE</b>	<b>No.</b>	<b>(%)</b>
<b>Age</b>		
18-29	946	(70)
30-39	196	(14.5)
40-49	103	(7.6)
50-59	77	(5.7)
60-64	21	(1.6)
65 and more	8	(0.6)
<b>Gender</b>		
Female	998	(73.9)
Male	353	(26.1)
<b>Nationality</b>		
Saudi	1215	(89.9)
Non-Saudi	136	(10.1)
<b>Marital status</b>		
Widow	12	(0.9)
Single	894	(66.2)
Married	404	(29.9)
Divorced	41	(3)
<b>Employment</b>		
Employed	425	(31.5)
Student	671	(49.7)
Non-Employed	219	(16.2)
Retired	36	(2.7)
<b>Educational level</b>		
Primary education	8	(0.6)
Intermediate education	26	(1.9)
High school education	383	(28.3)
Diploma	118	(8.7)
University education	712	(52.7)
Higher education	104	(7.7)
<b>Household monthly income (SR)</b>		
Less than 5000	188	(13.9)
5000-10,000	217	(16.1)
11,000-20,000	885	(65.5)
More than 20,000	61	(4.5)

\*n (%) shows data presented as numbers and percentages.

Figure 2a: Prevalence of chronic diseases among participants and types of chronic diseases.

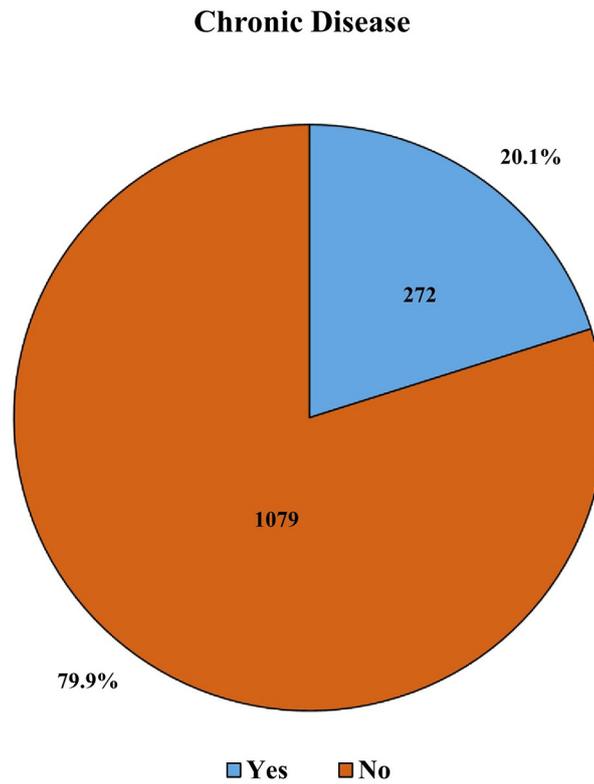


Figure 2b: Types of prevalent chronic diseases among participants and chronic disease.

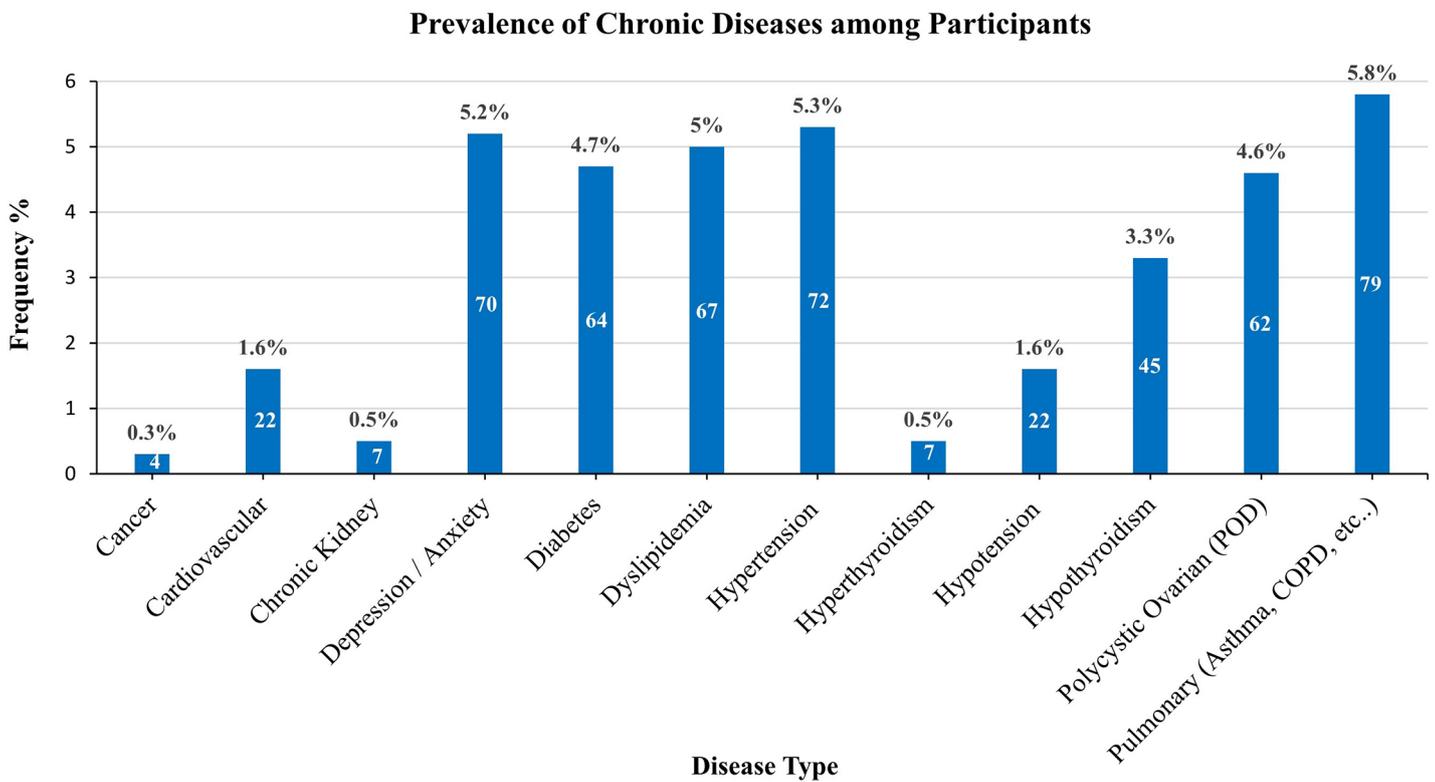
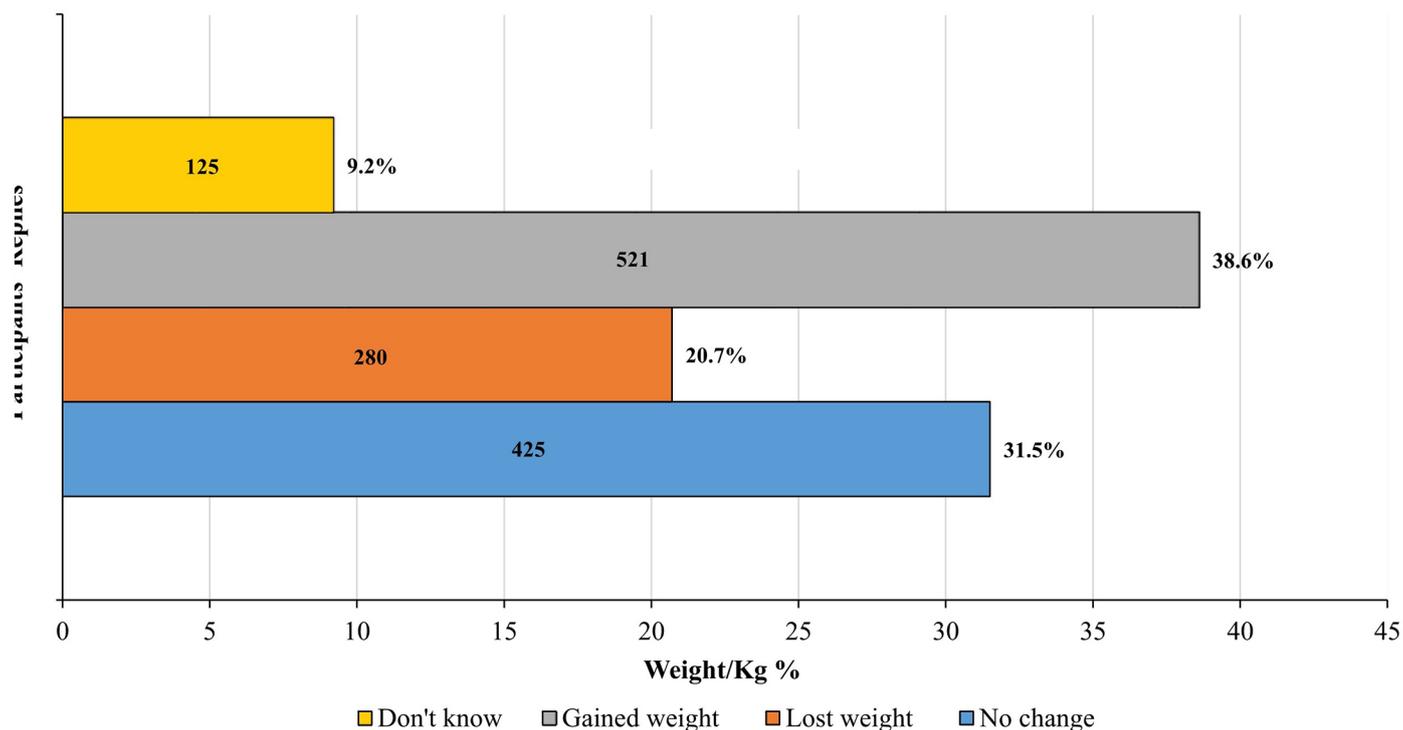
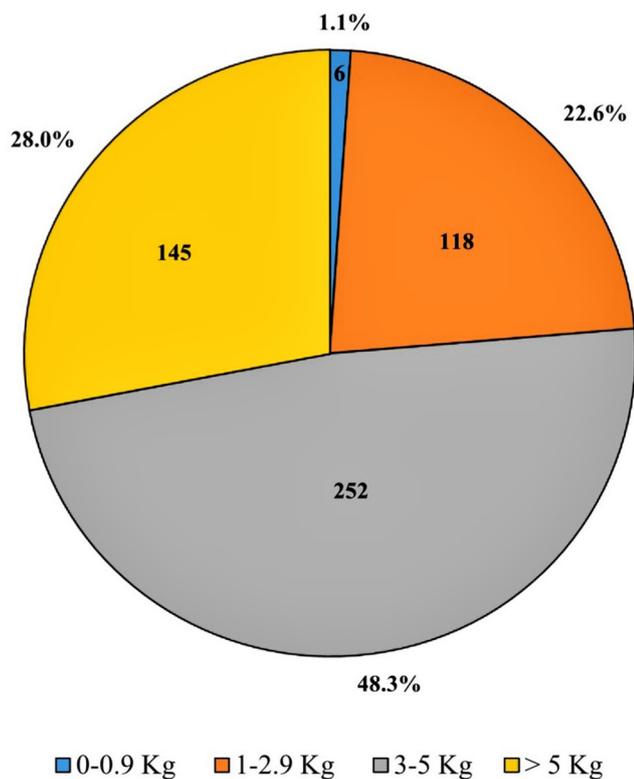


Figure 3: Weight change during the COVID-19 pandemic, gain and loss

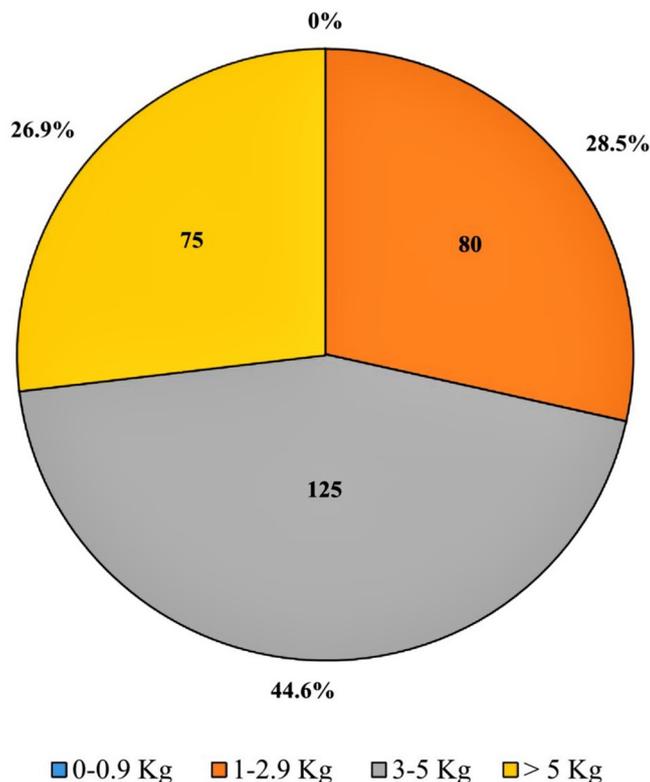
**FIGURE (3)**  
**Weight Change**



**FIGURE (3)**  
**Weight Gain % (No.:521)**



**FIGURE (3)**  
**Weight Loss % (No.:280)**



**Table 2: Comparison of DS consumption, PM practices and H/P use before and during the COVID-19 pandemic.**

Variable	Before COVID-19		During COVID-19		McNemar test (P-value)
	No.	(%)	No.	(%)	
Multivitamins	318	(47.3)	468	(69.7)	< 0.001
Vitamin C	282	(42)	588	(87.6)	< 0.001
Vitamin B complex	129	(19.2)	185	(27.5)	< 0.001
Vitamin D	358	(53.3)	517	(76.9)	< 0.001
Vitamin A	39	(5.8)	62	(9.2)	0.067
Iron	221	(32.9)	321	(47.8)	0.07
Omega 3	176	(26.2)	252	(37.5)	0.61
Zinc	159	(23.6)	281	(41.7)	< 0.001
Calcium	126	(18.7)	137	(27.1)	< 0.001
Potassium	40	(5.9)	54	(7.9)	0.51
Probiotics	40	(5.9)	61	(9)	0.032
<b>PM PRACTICES, HERBS/PLANTS USE</b>					
Variable	Before COVID-19		During COVID-19		McNemar test (P-value)
	No.	(%)	No.	(%)	
Hijamah	45	(3.3)	127	(9.4)	< 0.001
(Cupping therapy)	48	(3.6)	98	(7.2)	< 0.001
Talbina	634	(46.9)	981	(72.6)	< 0.001
Honey	448	(33.2)	611	(45.2)	0.003
Dates	175	(13)	354	(26.2)	< 0.001
Figs	409	(30.3)	617	(45.6)	< 0.001
Olive/Olive oil	196	(14.5)	301	(22.2)	< 0.001
Pomegranate fruit	425	(31.5)	816	(60.3)	< 0.001
Black seeds	51	(3.8)	116	(8.5)	0.043
Senna	289	(21.4)	318	(23.5)	0.067
Garlic	230	(17)	329	(24.3)	0.452
Onion Vinegar	106	(7.8)	197	(14.5)	< 0.001
Vinegar	419	(31)	519	(38.4)	0.7
Ginger	336	(24.9)	438	(32.4)	0.066
Anise	261	(19.3)	284	(21)	0.561
Cumin	276	(20.4)	301	(22.2)	0.073
Chamomile	435	(32.3)	536	(39.6)	0.082
Peppermint	118	(8.7)	132	(9.7)	0.613
Coffee peals	69	(5.1)	107	(7.9)	0.41
Lemon leaves	36	(2.7)	49	(3.6)	0.152
Orange leaves	131	(9.7)	197	(14.5)	0.031
Costus	109	(8.1)	176	(13)	0.051
Marjoram	128	(9.5)	169	(12.5)	0.16
Fenugreek	168	(12.4)	217	(16)	0.065
Carnation					

\*n (%) shows data presented as numbers and percentages. \*\*P-Value is significant at <0.05

**Table 3: Differences in the prevalence and patterns of DS consumption, PM practices, and H/P use based on participants' gender**

Variable	Female		Male		$\chi^2$	P-value
	FRQ	(%)	FRQ	(%)		
Do you usually take any dietary supplements such as vitamins or minerals?						
➤ No	449	(66)	231	(34)	43.61	< 0.001
➤ Yes	549	(81.8)	122	(18.2)		
Was your intake of dietary supplements affected during the COVID-19 pandemic and quarantine period?						
➤ Yes, my intake was increased	143	(76.9)	43	(23.1)	30.25	< 0.001
➤ I don't take any food supplements	345	(66)	178	(34)		
➤ I only have started taking them during the pandemic	74	(81.3)	17	(18.7)		
➤ Yes, my intake was decreased	78	(81.3)	18	(18.8)		
➤ No, my intake was not affected at all	351	(78.3)	97	(21.7)		
Did you follow practices of prophetic medicine, or used herbs/plants mentioned in the prophetic medicine before the emergence of the Covid-19 pandemic?						
➤ No	429	(67.3)	208	(32.7)	26.58	< 0.001
➤ Yes	569	(79.7)	145	(20.3)		
Were your prophetic medicine practices, use of herbs/plants affected during the COVID-19 pandemic and quarantine period?						
➤ I don't practice any prophetic medicine or use herbs/plants	281	(64.7)	153	(35.3)	31.86	< 0.001
➤ No, my intake was not affected at all	415	(77.1)	123	(22.9)		
➤ I only have started taking them during the pandemic	55	(82.1)	12	(17.7)		
➤ Yes, my intake was increased	223	(80.8)	53	(19.2)		
➤ Yes, my intake was decreased	24	(66.7)	12	(33.3)		

\*n (%) shows data presented as numbers and percentages. \*\*P-Value is significant at <0.05

**Table 4: Differences in the prevalence of DS consumption, PM practices, and H/P use based on participants' prior COVID-19 infection**

Variable	No prior COVID-19 infection No. 904		Prior COVID-19 Infection No. 447		$\chi^2$	**P-value
	*FRQ	(%)	*FRQ	(%)		
Do you usually take any dietary supplements such as vitamins or minerals?						
➤ No	453	(66.6)	227	(33.4)	0.05	<b>0.816</b>
➤ Yes	451	(67.2)	220	(32.8)		
Was your intake of dietary supplements affected during the COVID-19 pandemic and quarantine period?						
➤ Yes, my intake was increased	109	(58.6)	77	(41.4)	18.37	<b>0.003</b>
➤ I don't take any food supplements	369	(70.6)	154	(29.4)		
➤ I only have started taking them during the pandemic	<b>49</b>	<b>(53.8)</b>	<b>42</b>	<b>(46.2)</b>		
➤ Yes, my intake was decreased	60	(62.5)	36	(37.5)		
➤ No, my intake was not affected at all	312	(69.6)	136	(30.4)		
Did you follow practices of prophetic medicine, or used herbs/plants mentioned in the prophetic medicine before the emergence of the Covid-19 pandemic?						
➤ No	451	(70.8)	186	(29.2)	8.22	<b>0.004</b>
➤ Yes	453	(63.4)	261	(36.6)		
Do you believe that the people's information and beliefs about the use of prophetic medicine practices and herbs/plants have increased during the Covid-19 pandemic?						
➤ No	64	(71.1)	26	(28.9)	14.87	<b>0.001</b>
➤ Not sure	423	(71.9)	165	(28.1)		
➤ Yes	417	(62)	256	(38)		
Do you believe that the use of prophetic medicine practices, and herbs/plants? Could prevent and/or cure COVID 19?						
➤ No	234	(56.2)	125	(34.8)	6.5	<b>0.039</b>
➤ Not sure	464	(70.1)	198	(29.9)		
➤ Yes	206	(62.4)	124	(37.6)		
Were your prophetic medicine practices, use of herbs/plants affected during the COVID-19 pandemic and quarantine period?						
➤ I don't practice any prophetic medicine or use herbs/plants	316	(72.8)	118	(27.2)	35.71	< <b>0.001</b>
➤ No, my intake was not affected at all	380	(70.6)	158	(29.4)		
➤ I only have started taking them during the pandemic	34	(50.7)	33	(49.3)		
➤ Yes, my intake was increased	<b>153</b>	<b>(55.4)</b>	<b>123</b>	<b>(44.6)</b>		
➤ Yes, my intake was decreased	21	(58.3)	15	(41.7)		

\*n (%) shows data presented as numbers and percentages. \*\*P-Value is significant at <0.05

## Discussion

Several countries enforced lockdowns due to the COVID-19 pandemic and subsequent measures to prevent its spread; these measures have substantially changed people's lifestyles, including dietary habits and physical activity to cope with the pandemic (9).

This study examined the impact of the COVID-19 pandemic on dietary supplements consumption, PM practices and H/P use among the adult population in SA before and during the pandemic. In addition, the impact of COVID-19 on weight status and DS, H/P, PM use and practices was also examined.

The reports of the present study indicated significant changes in weight status during the COVID-19 pandemic, as 38.6% of participants gained weight during the pandemic, 48% reported weight gain of about 3-5 kilograms, and 28% gained more than 5 kilograms. In comparison to a population from the United States of America (> 3400 adults), weight gain during the first 12 months of the pandemic was reported by 48% of participants (10).

Saudi reports showed a prevalence of high consumption of multivitamin-multimineral products among 47% of 1105 participants (11). Studies also reported the benefits of DS consumption and H/P use in preventing and treating SARS-CoV-19 (7). The present study's findings emphasized the significant prevalence of DS consumption among the adult population in SA as half of the participants consume DS regularly, and 13.8% reported increased intake of DS during the pandemic. These outcomes are consistent with reports by Alkharashi, N. A. (10), where 15.6% of the Saudi population reported regular consumption of DS during the pandemic. The present study also confirmed more consumption by females 549 (82%), compared to males 122 (18%). Moreover, to combat the pandemic, DS consumption was confirmed to be higher than 451 (67%) among participants who were not previously infected with COVID-19, compared to the infected, 220 (33%).

Increased sales and popularity of DS and herbal products during COVID-19 were due to people's personal beliefs that they confer beneficial effects (5). Additionally, many communities adopted non-pharmacological preventative measures, claiming they were safer than prescription medications and essential to enhance health or prevent most chronic diseases (12). Vitamins C, B, and D supplements have been considered possible interventions for COVID-19 treatment (12,13).

Vitamin C was essential in boosting immunological function interfering with COVID-19 pathology-related actions (14,15). The present study showed a significant increase in vitamin C supplement consumption before and during the pandemic, as 87.6% of the participants used it during COVID-19 outbreak.

Vitamin D has emerged as a critical prophylactic and therapeutic potential against SARS-CoV 2 and has been linked to several elements of immunological health and antiviral defense due to modulating both the adaptive and innate immune systems (16). However, in the present study, significant vitamin D consumption occurred before the pandemic and increased by 76.9% in consumption during the pandemic. Observational studies reported the consumption of vitamin D supplements by 41% of the participants before and during the pandemic. They addressed the need for adequate vitamin D intake for its potential association with the incidence of COVID-19 and its importance to overall health (17).

Zinc supplementation is essential for the wellness and growth of adaptive and innate immune cells (10). Low zinc levels can be a risk factor for pneumonia in elderly patients, owing to its anti-inflammatory and antioxidant activity (10). Zinc supplementation is advertised to improve the overall immune system health during the COVID-19 pandemic (18,19). The present study findings showed a significant difference in the consumption of Zinc supplements before and during the pandemic, with 42% of the participants reporting using the supplement during the pandemic; on the other hand, Alkharashi, N.A. (10) findings indicated that 72.9% of the participants used the supplement during the pandemic.

The worldwide outbreak of COVID-19 has raised many concerns among people due to the lack of evidence-based treatments, leading to their dependency on alternative traditional recipes to strengthen their immunity and decrease the risk of infection (1). The present study's findings indicated that some practices of PM and use of H/P were significantly higher during the pandemic than before. Herbs are widely used in SA, and reports showed that 88% of the Saudi population uses herbs for different reasons, and the use was mainly 88.7% for therapeutic purposes (4). In the context of the COVID-19 pandemic, Saudi studies reported that 22% of participants claimed that using DS and herbal products reduces the risk of infection with COVID-19 during the pandemic period (10). This trust was significantly ( $p= 0.039$ ) more likely to be reported by participants who had no prior COVID-19 infection, 206 (62%), compared to those with prior infection 124 (38%).

Participants of the present study also claimed that they significantly ( $P < 0.00$ ) increased their PM practices of consuming natural products such as Talbina, dates, figs, olive/olive oil, pomegranate fruit, and onion vinegar during the pandemic. Black seeds use also increased ( $P < 0.043$ ) as well as orange leaves ( $P < 0.031$ ). These H/P are commonly used in the Middle East due to their embedded relation to Islamic culture. They are stated in the Holy Quran and PM(20) and widely practiced in Saudi Arabia (21). Honey benefits are highly acknowledged by PM and Qur'anic verses to enhance overall health (22). Black seed was introduced as a potential adjuvant therapy to COVID-19, as it possesses antiviral, antioxidant and anti-inflammatory properties propitiates (23).

In another narration, Prophet Mohammed (Peace be upon him) stated that “There is healing in Black Cumin (Black seed) for all diseases except death.” (24). Since ancient times, olives and olive oil have been used to treat many diseases, including influenza and rheumatoid arthritis (25). They have many health-promoting and pharmacological properties, including immunity-boosting (26).

Cupping therapy (Hijama) is a form of a PM. It is also considered by alternative medicine and is famous in China and the Middle East, in which pressure is applied to the skin through suction cups (27). Several studies reported the potential benefit of cupping therapy for pain conditions, Cough, Dyspnea, Hypertension and stroke rehabilitation (28,29). In the present study, n=127 (9.4%) used cupping therapy during the pandemic, and n=45 (3.3%) used it before the pandemic, with a statistical difference of  $P=0.0001$ . However, in a study conducted by Ismail et al. to assess the use of traditional medicine in treating migraine during the COVID-19 pandemic in Kuwait, among n= 406 respondents who used traditional medicine, only 1.1% reported using Hijama during the pandemic (23).

The finding of the present study showed that 14.5%, n=197 of the surveyed participants, drank more onion vinegar during the pandemic. This behavior was also observed in the 2003 Severe Acute Respiratory Syndrome (SARS) pandemic (30), even though no scientific evidence proves the efficacy of vinegar drinking in reducing the risk of viral infection or death.

## Conclusion

In conclusion, this study provided insight into the effect of the COVID-19 pandemic on DS and H/P consumption and PM practices among the population in SA. Some products' consumption and practices of PM were increased during the COVID-19 pandemic as a protective measure against infection. Although a few DS products, such as vitamin C and D, are reported in the previous literature to be beneficial, other products, such as vinegar, were highly consumed among the participants despite lacking evidence of their effectiveness.

We recommend:

- Health professionals should conduct public awareness campaigns to educate the general population about the risks and benefits of dietary supplements, particularly over-the-counter ones which require no prescription.
- The government is to employ regulations for PM practices if self-medicated and the consumption of dietary supplements and H/P if self-prescribed.
- Further extensive scientific evidence needs to be sought regarding the consumption and practices in COVID-19.

## Limitations

Using an online survey for data collection might have excluded some vulnerable populations who could not be reached. Furthermore, data collection took longer than expected to reach the target population. Data collectors had to be recruited from different regions of SA to help

share the survey link with the adult population in their regions and produce a diversified sample representing different geographical areas of SA.

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