

# Comparison Between Healthcare Professionals And The General Population On Parameters Related To Natural Remedies Used During The COVID-19 Pandemic

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## Research Article

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# Abstract

*Introduction:* Herbal medicine is a common method for symptom relief and treatment because of its ample availability and lack of regulation on its prescription. However, herbal use is associated with adverse effects, drug interaction, and sometimes life-threatening complications. During the coronavirus disease (COVID-19) pandemic, people shifted toward herbs when modern medical field failed to discover a treatment or immunization early in the course of the disease. Based on expert consensus, herbal medicine was recommended in Eastern countries, although trials were still ongoing.

*Methods:* A descriptive web-based anonymous survey was created and distributed online all-over Saudi Arabia to gather information on commonly used herbs, knowledge, and attitude towards them among general population (GP) and health care workers (HCWs).

*Results:* Although natural product use was high among GPs, both groups used similar herbs, reflecting cultural tradition and beliefs. However, GPs show better knowledge and attitude about herbal medicine than HCWs.

*Conclusion:* Mental exhaustion during the COVID-19 pandemic and a lack of medicine-based evidence might influence HCW's trust and knowledge on herbal medicine. Therefore, research and educational courses on herbal medicine for all medical practitioners are needed for proper counseling, thereby reducing risk and ensuring patient safety.

## Introduction

Herbal products are a commonly used treatment method worldwide containing the active ingredients present in natural plants, which can be used to relieve certain symptoms. Herbal products are cheap which supports its use by the general population (GP) (Parveen et al., 2015; Tilburt and Kaptchuk, 2008). The regulation on the medicinal manufacture and commercialization of herbs and natural products varies between countries without specific control on marketing (World Health Organization, 1998). More than one-third of the elderly population in the United States has used  $\geq 1$  herbal supplements for different conditions (Rashrash et al., 2017). While Middle Eastern countries reported 23–80% herbal medicine users, in Saudi Arabia, this proportion increased to  $> 80\%$  of GP; most of whom are women who employ herbs and are interested in herbal and traditional medicine (Al Akeel et al., 2018; John and Shantakumari, 2015).

In general, GP uses herbal and natural products as the first therapeutic option and believes in herbal products' safety (Alkhamaiseh and Aljofan, 2020; Tengku Mohamad et al., 2019). For this reason, among others, herbs have been used for conditions such as cough symptoms as well as chronic diseases, such as rheumatoid diseases or cancer (Barry, 2018). Further, caregivers are reported to commonly give herbal products to their children, because they believe in their safety, and they lack awareness about the possible harmful effects of herbs or drug interactions that could be fatal (Lanski et al., 2003). This lack of knowledge on the usage of herbs and natural products can lead to unexpected side effects or life-

threatening drug interactions (Faizi and Kazmi, 2017; Yang, 2020). Natural products can cause toxicity if excessively taken without prescription or proper supervision (Alkhamaiseh and Aljofan, 2020; Fatima and Akmal, 2016).

On the other hand, healthcare workers (HCWs) who studied modern medicine had limited exposure to this subject as part of the course curriculum, and most HCWs lack training in this branch of medicine unless out of self-interest (Albadr et al., 2018; Clement et al., 2005). In such cases, HCWs show interest if they are supported by quality knowledge and guidelines (Hilal and Hilal, 2017). Although a course on herbal medicine is being implemented as part of the curriculum in a few colleges (Dvorkin et al., 2004) more research and training are needed.

Interestingly, herbal medicine played a significant role during the first severe acute respiratory syndrome epidemic in some countries such as China (World Health Organization, 2004). During the initial coronavirus disease (COVID-19) phases, the rapid spread of the pandemic, its high infective rate, and lack of evidence-based medicine or effective vaccines, led to people leaning towards the use of natural products to enhance their immunity to protect themselves and fight viral infection (Alyami et al., 2020; Panyod et al., 2020). A review on the use of herbs as adjuvant treatment for patients with COVID-19 was recently published (Silveira et al., 2020), although the safe dosage is still based on expert consensus reported mainly from Eastern countries (Ang et al., 2020). Additionally, several randomized controlled trials on the safety of herbal products as a co-treatment for COVID-19 are being conducted; however, the results are not yet available (Lopez-Alcalde et al., 2020). Although various regulations are established, they are not well implemented because of the challenges facing this type of medicine regarding the lack of randomized control trials and the vast differences in the plants used from one country to another (Parveen et al., 2015). Despite their lack of knowledge, GP and HCWs continue to use it for protection and immunity-boosting against the coronavirus infection. For example, during the COVID-19 pandemic in Saudi Arabia, a recent study investigated the GP's knowledge on herbal medicine use showing they have moderate knowledge (Alyami et al., 2020).

On the other hand, several studies not related to the pandemic found that HCWs expressed the need for further education regarding herbal use (Hilal and Hilal, 2017; Sherif et al., 2019). However, to the best of our knowledge, no study has compared the knowledge and attitude of GP and HCWs towards herbal therapy. Therefore, the current study aimed to compare the knowledge and attitude of HCWs and the GP on herbs and natural products as protective and immunity strengthening measures in Saudi Arabia during the COVID-19 pandemic.

## **Material And Methods**

### *2.1 Study design and population*

The current study was a descriptive cross-sectional study conducted anonymously over the Kingdom of Saudi Arabia between May 1, 2020 and June 31, 2020. The sample size of the study groups was calculated using OpenEpi version 3.0 (Dean et al., 2013), considering the population size of Saudi Arabia

which is approximately 34 million (General Authority for Statistics in Saudi Arabia, 2020) for the GP study group and the total number of HCWs in Saudi Arabia, which is about 500,000 (Saudi Commission for Health Specialties, 2020), for the HCW study group. The minimum required sample size to achieve a 95% confidence interval and a 5% margin of error was 385 participants per study group. Every GP and HCW in Saudi Arabia was able to participate in the study regardless of their COVID-19 infection status, or age provided they were > 18 years old. Any participants < 18-year-old were excluded from the study.

## *2.2 Study tool*

A questionnaire was developed by three expert assistant professors at the author's institute to assess the level of knowledge regarding herbs and natural product use as protective measures during the COVID-19 pandemic in GP and HCWs. The questionnaire was tested in over 100 people for correction of misperceived questions, and then translated to Arabic and validated with another pilot study on 20 subjects; however, pilot studies were not included for analysis and/or results. The questionnaire was divided into three parts and included 14 questions. The first part included eight questions and started by asking the participants if they were HCWs, their specialty, and so on, and the remaining six questions dealt with general demographic information, such as the area of residence in Saudi Arabia, nationality, gender, age, educational level, and health status. The second part included one question: it gave a broad choice of herbs and natural products (14 items) to estimate its prevalence of use in both study groups during the pandemic. The third part consisted of five questions focusing on the participants' knowledge and attitude toward herbs and natural products use as protective measures during the COVID-19 pandemic and information sources. The questionnaire was validated by the Biomedical Ethics Committee at author's institute before publication and circulation among the participants. Since it was not feasible during this time to perform a community-based national sampling survey, we collected the data online via a Google survey, which included an online informed consent form on the first page. The survey was published through social media platforms. Furthermore, the Saudi Commission for Health Specialties supported us by emailing the survey to all registered HCWs in their database.

## *2.3 Data analysis*

Study data were extracted, revised, coded, and fed to statistical software IBM SPSS version 22 (SPSS, Inc., Chicago, IL), and then statistically analyzed using two-tailed tests. For knowledge items, each correct answer was scored one point, and then discrete scores for the knowledge items were summed to an overall knowledge score (0–5). A participant with a score < 60% of the maximum score (< 3 points) was considered to have poor knowledge, while good knowledge was considered if he had a score  $\geq$  60% of the maximum. Descriptive analysis based on the frequency and percent distribution was performed for all variables according to study group (HCWs or GP), including demographic data, herbs, product use, awareness, and practice. Cross-tabulation was used to assess the distribution of herbs employed by study groups and their awareness according to participants' personal and work situations. Relationships were verified using the Pearson chi-square test. A result was considered statistically significant for a  $P$ -value  $\leq$  0.05.

# Results

## 3.1 Sociodemographic data

The study included 1249 participants; 274 were HCW (mean age, 28.6 ± 9.6; females, 176 [64.2%]) and 975 were GP (mean age, 27.4 ± 8.6; females, 785 [80.5%]). Regarding qualification, 142 (51.8%) HCWs had a bachelor's degree compared with 571 (58.6%) of GP, while 39.1% HCWs had a postgraduate degree compared with 12.3% of the GP. A total of 29.2% HCWs had chronic health problems compared with 26.2% of GPs (Table 1).

Table 1  
Demographic data of HCWs and the GP, Saudi Arabia. HCWs (healthcare workers), GP (general population).

Demographic data		Groups			
		HCWs (n = 274)		GP (n = 975)	
		No	%	No	%
Age in years	< 30 Yrs.	97	35.4%	349	35.8%
	30–49	95	34.7%	283	29.0%
	50+	82	29.9%	343	35.2%
Sex	Male	98	35.8%	190	19.5%
	Female	176	64.2%	785	80.5%
Qualification	Less than high school	0	0.0%	32	3.3%
	High school	3	1.1%	175	17.9%
	Bachelor's degree	142	51.8%	571	58.6%
	diploma degree	22	8.0%	77	7.9%
	Postgraduate	107	39.1%	120	12.3%
Nationality	Saudi	253	92.3%	939	96.3%
	Non-Saudi	21	7.7%	36	3.7%
Have a chronic disease	Yes	80	29.2%	255	26.2%
	No	194	70.8%	720	73.8%

## 3.2 Comparison of commonly used herbs and natural products among participants

Table 2 illustrates the prevalence of herbs and natural product use as a protective measure against the COVID-19 infection, and shows that, in general, this measure was higher in GP than HCWs. There were statistically significant differences (all  $P = 0.001$ ) among GP and HCWs in terms of most used products

which were honey (GP: 83.9% vs. HCW: 79.2%), lemon 75.3% vs. 69%), orange (70.9% vs. 66.8%), black seed (69.7% vs. 68.2%), and garlic (64.1% vs. 52.2%).

**Table 2:** Herbs and natural products use as protective measure against COVID-19 infection by study groups: HCWs (Healthcare workers), GP (general population).

Herbs and natural products	Groups				<i>P-value</i>
	<i>HCWs (n=274)</i>		<i>GP (n=975)</i>		
	No	%	No	%	
Honey	217	79.2%	818	83.9%	0.001*
Lemon	189	69.0%	717	73.5%	
Orange	183	66.8%	691	70.9%	
Black seed	187	68.2%	680	69.7%	
Garlic	143	52.2%	625	64.1%	
Onion	78	28.5%	342	35.1%	
Turmeric	65	23.7%	340	34.9%	
Myrrh	52	19.0%	259	26.6%	
Olive oil	43	15.7%	174	17.8%	
Green tea	37	13.5%	117	12.0%	
Chili pepper	32	11.7%	107	11.0%	
Banana	16	5.8%	58	5.9%	
Sesame oil	16	5.8%	52	5.3%	
Vitamin C	14	5.1%	16	1.6%	
None	13	4.7%	11	1.1%	

*P*: Pearson's  $\chi^2$  test; \*  $P < 0.05$  (significant).

Interestingly, even the difference in the prevalence of herbs and natural product use between the study groups was statically significant. However, there was a similar pattern with regard to the type of natural products chosen by both groups (Fig. 1).

### 3.3 Knowledge and attitude of participants regarding herbal and natural product use

Regarding the participants' knowledge and attitude regarding the use of herbs and natural products as a protective measure during the COVID-19 pandemic (Table 3), only 10.6% of HCWs agreed that herbs or

natural products could protect from COVID-19 infection, a percentage that was not significantly different from the GP (11.4%,  $P= 0.097$ ). The rate of HCWs agreeing that herbs or natural products could strengthen immunity to the point of protection from COVID-19 infection even upon contact with an infected patient was also lower than that of the GP (10.9% vs. 12%,  $P= 0.227$ ). The lack of side effects of regular herbs or natural products use as preventive medicine was reported by significantly fewer HCWs than did the GP (77.7% vs. 87.7%,  $P= 0.001$ ). Interestingly, both study groups, about 85.2% of HCWs and 83.9% of GP, similarly believed ( $P= 0.811$ ) that herbs and natural products can help in having a healthy immune system but are not specifically related to protection from COVID-19 infection (Table 3).

Table 3: Participant's knowledge and attitude regarding herb and natural product use as a protective measure during the COVID-19 pandemic. HCWs (Healthcare workers), GP (general population).

Knowledge and attitude items		Group		<i>P</i> value
		HCWs	GP	
		%	%	
Herbs and natural products might protect from the COVID-19 infection	<i>Disagree</i>	60.6%	53.4%	0.097
	<i>Neutral</i>	28.8%	35.2%	
	<i>Agree</i>	10.6%	11.4%	
Why do you use herbs or natural products as protective measures during the COVID-19 pandemic?	<i>Herbs or natural products help only in reducing the severity of the COVID-19 infection symptoms</i>	9.3%	11.2%	0.811
	<i>Herbs or natural products help in having a healthy immune system but are not specifically related to the COVID-19 infection</i>	85.2%	83.9%	
	<i>Herbs or natural products specifically help in boosting the immune system to fight the COVID-0109 infection</i>	5.6%	4.8%	
Herbs or natural products might strengthen the immunity to the point of protection from the COVID-19 infection even in contact with an infected patient	<i>Disagree</i>	70.8%	65.4%	0.227
	<i>Neutral</i>	18.2%	22.6%	
	<i>Agree</i>	10.9%	12.0%	
Using herbs or natural products regularly as preventive medicine has no side effects	<i>No</i>	22.3%	12.3%	0.001*
	<i>Sometimes</i>	25.2%	29.4%	
	<i>Often</i>	36.9%	36.5%	
	<i>Always</i>	15.7%	21.7%	

*P*: Pearson's  $X^2$  test; \*  $P < 0.05$  (significant).

Regarding the association between knowledge level and other sociodemographic variables, such as gender and age, Table 4 illustrates the distribution of participants' knowledge level by their sociodemographic data. Good knowledge of the herbs and products used to protect against the COVID-19 infection was found among a significantly higher percentage of the GP compared with that of the HCWs (42.7% vs. 34.3%,  $P = 0.013$ ). In addition, 46.4% of older participants ( $\geq 50$  years) showed good knowledge compared with 35.7% of the young age group ( $P = 0.006$ ).

Table 4  
Distribution of participants' knowledge level by their sociodemographic data. The knowledge level was evaluated as poor or good based on the scoring system mentioned in the materials and methods

Personal data	Knowledge level		P-value
	Poor	Good	
	%	%	
Group			0.013*
HCWs	65.7%	34.3%	
General population	57.3%	42.7%	
Sex			0.723
Male	60.1%	39.9%	
Female	58.9%	41.1%	
Age			
< 30 Yrs.	64.3%	35.7%	0.006*
30–49	59.3%	40.7%	
50+	53.6%	46.4%	
<i>P</i> : Pearson's $X^2$ test; * $P < 0.05$ (significant).			

### 3.4 Knowledge of HCW participants about herbs and natural products as protective measures according to specialty

The total number of HCWs in the current study was 275, and their specialties illustrated in Fig. 2. Table 5 shows that 50% of the clinical nutrition specialists had a good knowledge level compared with 80% of public health, and 80% of radiologists, while only 47.7% of the nurses, 30% of the physicians, and 21.7% of pharmacists had a good awareness level regarding the use of herbs and natural products as protective

measures during the COVID-19 pandemic. These differences were found to be statically significant ( $P=0.004$ ).

Table 5  
Distribution of HCWs knowledge level regarding herbs by specialties. The knowledge level was evaluated as poor or good based on the scoring system mentioned in the materials and methods

Specialty	Knowledge level				P-value
	Poor		Good		
	No	%	No	%	
Clinical nutrition	8	50.0%	8	50.0%	0.004*
Health administrator	5	33.3%	10	66.7%	
Infection control	1	50.0%	1	50.0%	
Laboratory technologist	59	75.6%	19	24.4%	
Medical care and rehabilitation	4	66.7%	2	33.3%	
Medical equipment engineer	3	75.0%	1	25.0%	
Nurse	11	52.4%	10	47.6%	
Pharmacist	18	78.3%	5	21.7%	
Physician	70	70.0%	30	30.0%	
Public health promotion	1	20.0%	4	80.0%	
Radiologist	1	20.0%	4	80.0%	

*P: Exact probability test; \* P < 0.05 (significant)*

### 3.5 Most reported sources of information about herb and natural product use as protective measures

Figures 3 and 4 show the sources of information mostly used regarding herbs and natural products' role as a protective measure during the COVID-19 pandemic. The most-reported sources were social media (30.8%), followed by family and friends (20.5%), previous experience (16.7%), and published articles (16.4%), as can be observed in Fig. 3. Figure 4 illustrates the distribution of information sources by study groups (HCWs vs. GP), there were no significant differences, as social media was the most reported in both groups (33.6% and 30.1%, respectively;  $P=0.639$ ). However, published studies were the second most used source in HCWs (19.7%) while it was family and friends for GP (21.6%).

## Discussion

This study is the first to compare the knowledge and attitude between the GP and HCWs regarding herbal use as a protective measure during the COVID-19 pandemic. Most responders were young females in

both groups, as noticed in previous studies (Stjernberg et al., 2006; Zhang et al., 2015). The mean age of the respondents was 28+/- 9 years, which is similar to previous studies (Alyami et al., 2020; Stjernberg et al., 2006; Zhang et al., 2015), but this might be explained by the methodology, which was an online questionnaire due to the COVID-19 precautions, and with most of the older adults having limited interest in prolonged online surveys (Smith, 2008). However, older participants might also respond to surveys if an incentive had been given to answer the survey (Saleh and Bista, 2017).

The current study shows that commonly used herbs in Saudi Arabia in both study groups during the pandemic were honey followed by lemon, orange, black seed, and garlic, reasonable findings due to availability, and because cultural practices emphasize that these products can boost immunity. However, a recent study in Saudi Arabia on herbs and natural products used during the pandemic showed garlic first, followed by vitamin C (Alyami et al., 2020). This difference might be because the current study covers a broad choice of herbs and natural products, while the choice was limited in the Alyami et al. study (Alyami et al., 2020).

Remarkably, most of the participants in both groups agreed that herbal use does not protect from the COVID-19 infection but can enhance immunity (Panyod et al., 2020). However, the overall comparison found that the GP had better knowledge than HCWs about herbal medicine regarding their use during the COVID-19 as immune-boosting but not protective agents. In line with this finding, several studies reported that HCWs need further education and training on herbal medicine to improve their knowledge (Hilal and Hilal, 2017; Kemper et al., 2003; Sherif et al., 2019). The explanation of the GP's good knowledge in the current study could be that the GP continued looking for natural immune-boosting agents to protect themselves against the coronavirus infection during the pandemic, and the influence of cultural beliefs on Islamic and traditional medicine in Saudi Arabia. With regard to HCWs, their scientific thinking and reasoning tendency, lack of interest or trust concerning topics supported by insufficient evidence might explain their poor level of knowledge.

Regarding the association between level of knowledge and age, the current study showed that the older population had a significantly better knowledge, which can be attributed to their life experience.

Worldwide regulations are still not well established or consistent, even though both Western and Eastern countries implemented regulations designated for the use of herbal medicine (Jagadeeswara Reddy et al., 2020). In Saudi Arabia, no well-formulated body of work provides supporting evidence regarding herbal medicine (Kemper et al., 2003). Therefore, the present study found that the main source of information about herbs in both groups was social media, non-evidence-based blogs, and relatives, all leading to incorrect practices. Indeed, there is an urgent need for specific guidelines for Saudi Arabia besides implementing herbal medicine education as part of the modern curriculum.

HCWs do not receive an education or training on complementary and alternative medicine (CAM) or herbs in their undergraduate or postgraduate studies resulting in a lack of knowledge and competency in this type of medicine (Hilal and Hilal, 2017). However, they showed a better general understanding of herbs' effects in terms of beneficial effects and side effects (Asmelashe Gelayee et al., 2017; Sherif et al., 2019).

Obviously, research must be conducted on the specific herbs available in Saudi Arabia, as each country has its own kind based on agriculture (Tilburt and Kaptchuk, 2008). HCWs, especially physicians, pharmacists, nurses, and dietitians, who frequently interview patients who take herbs that can potentially lead to cross-reactions with other chemicals and which could be life-threatening, need to have adequate knowledge to conduct proper counseling regarding the use of herbal medicine.

## Conclusions

Herbal medicine is commonly used without restrictions by the GP. Research on the most common types of herbs employed in a particular geographical area must be conducted to define evidence-based protocols and create local guidelines. Implementing CAM education within the under-graduate curriculum to empower HCWs to conduct proper counseling with their patients to reduce complications and ensure patient safety is warranted. This will in turn help accomplishing the Saudi 2030 goal of having a healthy and safe community. The current study is limited by the small sample size of the HCW group due to pandemic and stress. Therefore, we suggest performing a more extensive study, including numerous HCWs, particularly those with regular contact with patients such as physicians, nurses, and pharmacists.

## Declarations

- **Ethics approval and consent to participate**

The study was ethically approved by the Biomedical Ethics Committee, Faculty of Medicine, Umm Alqura University (approval no.: HAPO-02-K-012-2020-04-378), and it conformed to the ethics guidelines of the Declaration of Helsinki. The participants were recruited online and were provided a URL that took them to the survey page once they were agreed to participate after reading the informed consent on the survey's front page.

- **Consent for publication**

Not applicable

- **Availability of data and materials**

All data generated or analyzed during this study are included in this published article.

- **Competing interests**

The authors have no conflicts of interest to declare.

- **Funding**

The authors did not receive support from any organization for the submitted work.

- **Authors' contributions**

Alotiby, A. conceptualized the project, performed data collection, entry, and analysis. Alotiby, A. and Alshareef, M. contributed equally to designing methodology, data analysis and interpretation, and manuscript development. All authors approved the final version of the manuscript.

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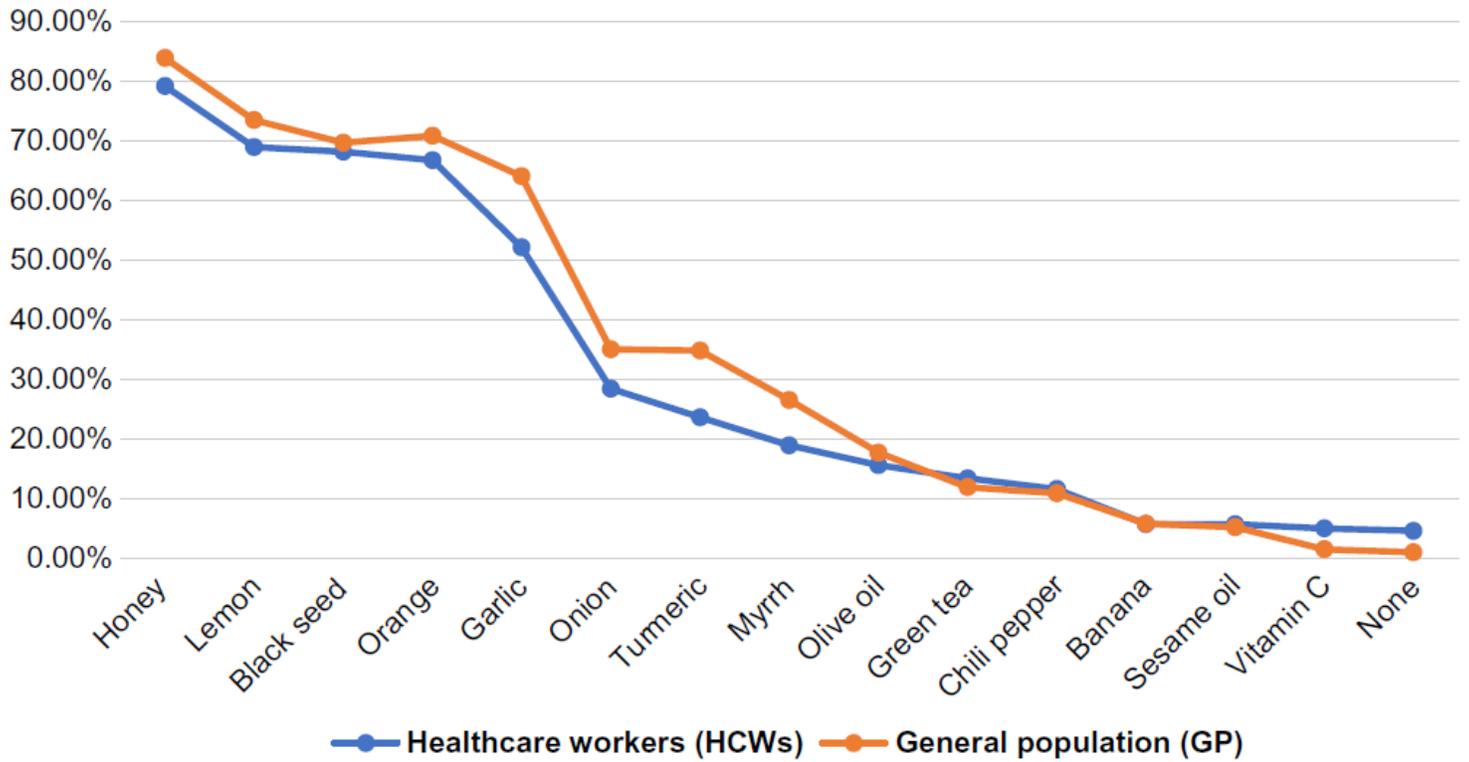
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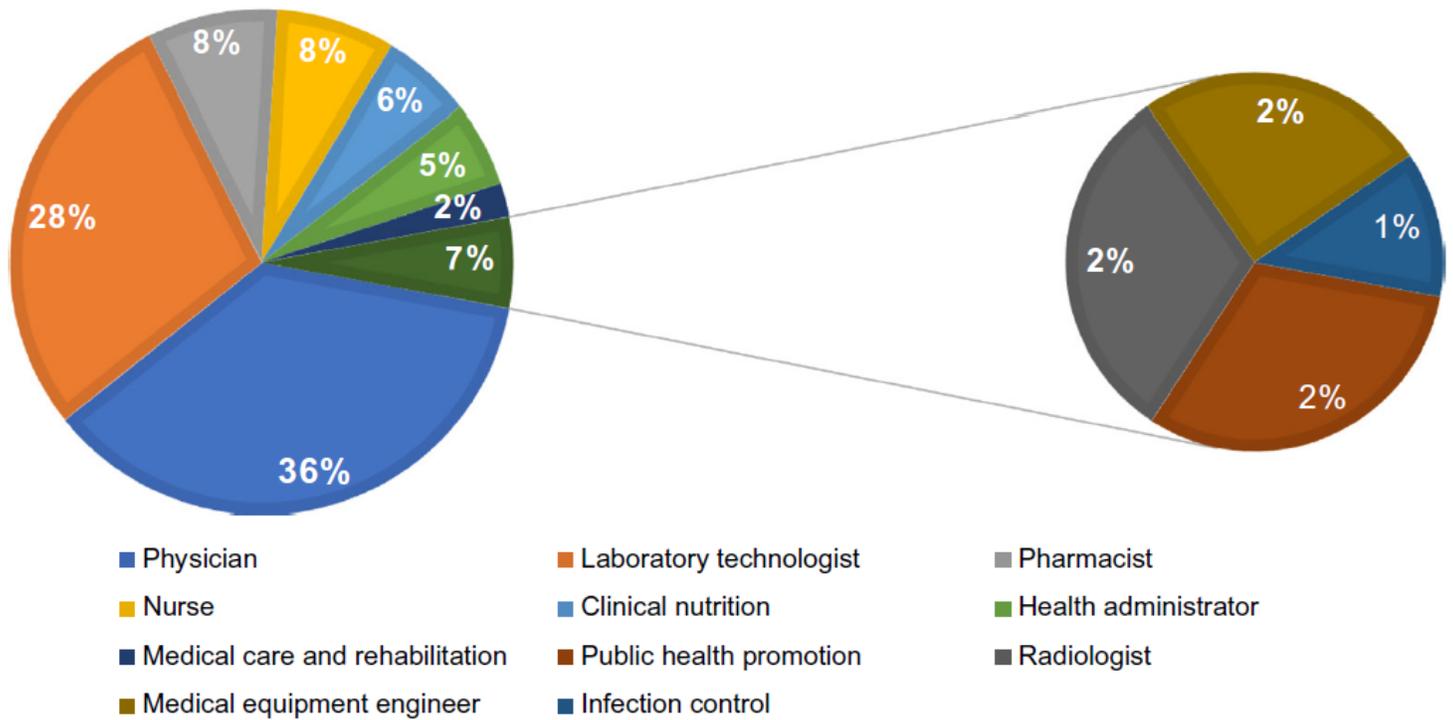
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## Figures



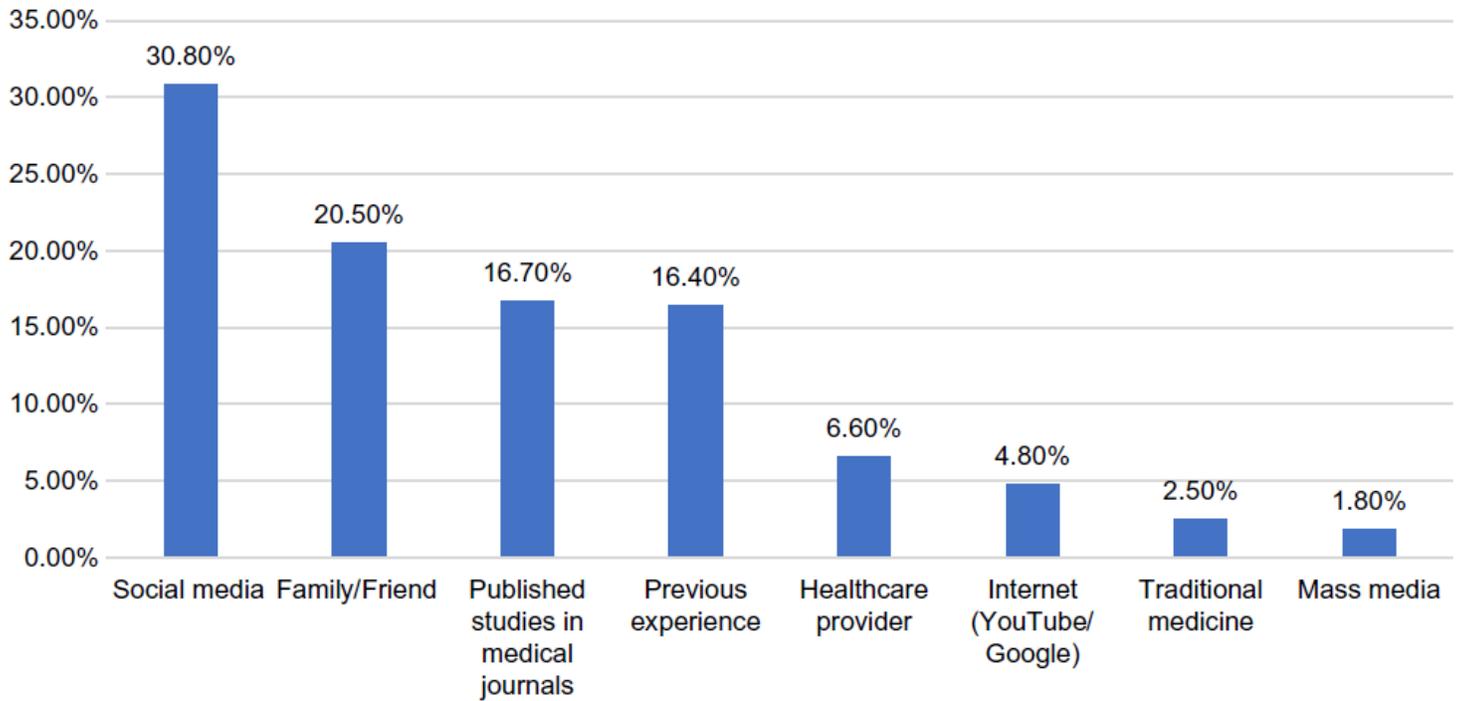
**Figure 1**

Preferred types of herbs and natural products used during the COVID-19 pandemic in both study groups in Saudi Arabia.



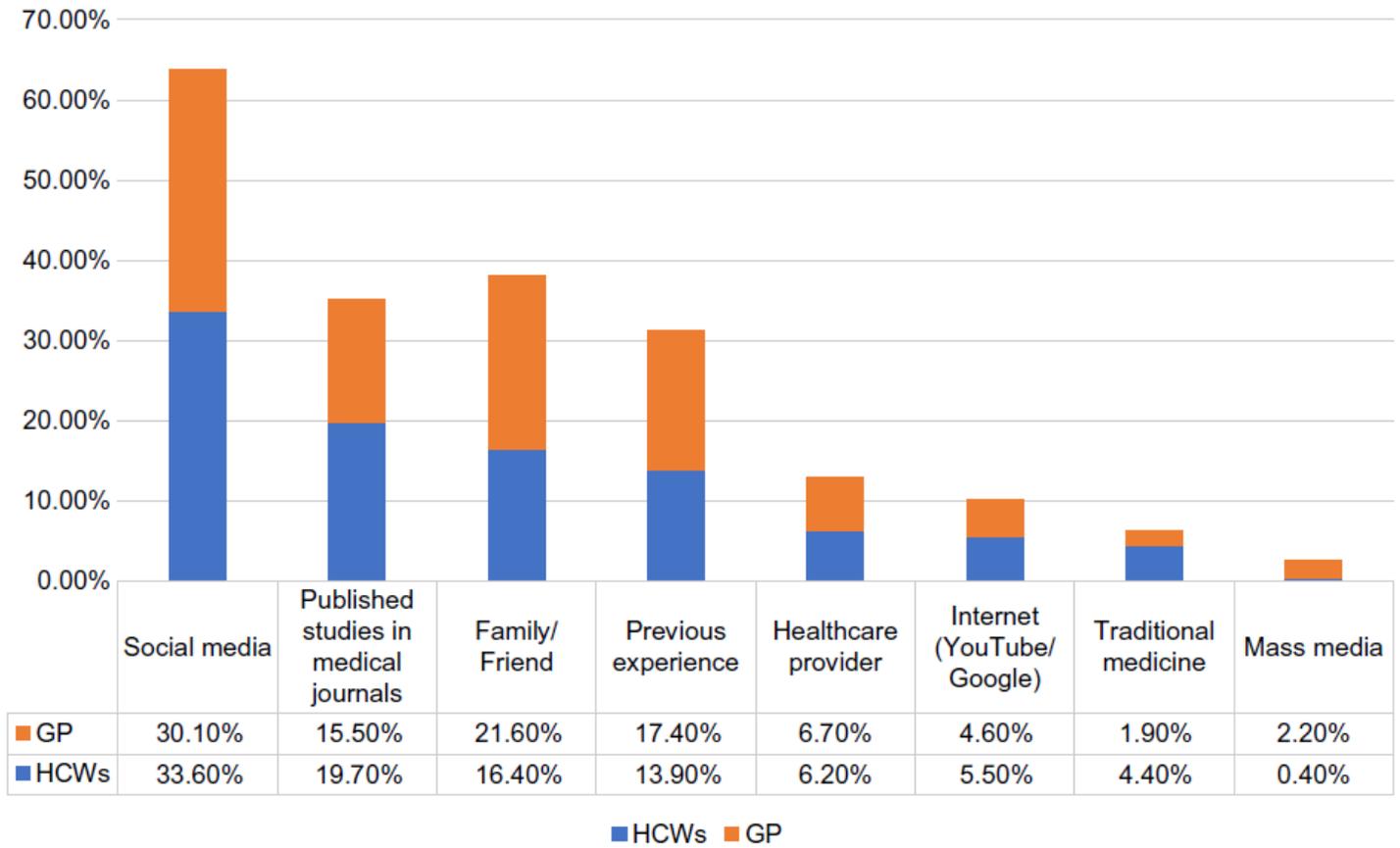
**Figure 2**

Distribution of HCW participants regarding their specialties. HCWs, healthcare workers.



**Figure 3**

Sources of information regarding herbs and natural products' role as a protective measure during the COVID-19 pandemic in all participants.



**Figure 4**

Sources of information regarding herbs and natural products' role as protective measure during the COVID-19 pandemic according to groups. HCWs, healthcare workers; GP, general population.