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Use of Traditional Medicines for Prevention and Treatment of Covid-19. A Cross-Sectional Survey in Four African Countries

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Article Information

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Retsepile Motanyane and William Nelson were involved in the creating of the questionnaire, its online distribution, data collection and statistical analysis and writing of the manuscript.
Wang ShuMei conceptualized the research, supervised the project and contributed in the final writing of the manuscript.

ABSTRACT

BACKGROUND: The COVID-19 pandemic has survived for a long time without a definitive medicine forcing people to turn to traditional medicines. However, it is not clear whether COVID-19 influenced people to trust and use traditional medicine.

PRIMARY STUDY OBJECTIVE: To explore whether lack of definitive medication for COVID-19 pandemic had any influence on the use of traditional medicine in four African countries.

METHODS/DESIGN: A questionnaire consisting of 12 questions was administered using online platforms to people aged 18 years and above in Ghana, Lesotho, South Africa and Tanzania between April and June 2020. The questionnaire assessed respondent's belief on traditional medicine and whether they used or ready to use for the pandemic. Chi-square and multivariate logistic regression were analyzed using SPSS.

RESULTS: Three hundred and eighty responses were collected from the four African countries. It was found that, 85.5% (n=325) of respondents have used traditional medicine before the pandemic. 86.3% of respondents (n=328) reported to know some herbs that are suitable for COVID-19, 80% (n=304) have thought of using the herbs and 52.9% (n=201) have actually used the herbs. Country of residence, occupation, belief in herbal medicine and knowledge on herbs influenced the use of herbs.

CONCLUSION: Knowledge of herbs that were believed to be suitable for COVID-19 pandemic influenced the use of traditional medicine. Surprisingly, the commonly used herbs have been scientifically investigated and have shown to have some therapeutic effect against SARS-CoV-2.

INTRODUCTION

The end of 2019 was marked by a number of people presenting with pneumonia which was later confirmed to be originating from a family of coronaviruses SARS-CoV-2. Coronavirus is a pathogen that primarily attacks the respiratory system [1] with early and persistent signs of fever, sore throat and dry cough [2,3]. The outbreak of SARS-CoV-2 was associated with human consumption of bats and mode of human-human transmission is by direct contact of human respiratory droplets [4,5]. Since the outbreak, the number of infected people around the world has increased tremendously, as of 17 November 2020 there were 54,301,156 global confirmed cases of COVID-19 and 1,316,994 deaths reported to World Health Organization (WHO) [6]. According to the WHO regions, Africa has the second lowest number of recorded cases – after Western Pacific.

Traditional herbal medicine is defined by WHO as "the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness" [7]. It has been used for centuries by different ethnic groups to treat a variety of diseases [8]. Africa is no exception in the use of herbal medicine as it used to be the dominant form of medicine before the arrival of Europeans [9].

Since the onset of the outbreak, experts all over the world have been working tirelessly to develop appropriate vaccine and medicine against the virus. During this frantic period, people have sought to self-medicate using both western and traditional medicine that have been used for respiratory and viral infections. Considering that people had no recommended western medicine or vaccine, we conducted a questionnaire-based online cross-sectional survey to explore whether COVID-19 pandemic had any significant influence on the use of traditional herbal medicine. The survey was conducted in Ghana, Lesotho, South Africa and Tanzania.

METHODS

STUDY DESIGN AND POPULATION

The study was approved by the Ethics Committee of Chongqing Medical University with approval number CQMU/RE/20/39. This was a cross-sectional survey study of adult population from countries hit by COVID-19 pandemic. The study population included any literate adult person (aged 18 years and more) from Ghana, Lesotho, South Africa and Tanzania with access to online ques-

tionnaires during COVID-19 pandemic. The survey was conducted between April and June 2020.

QUESTIONNAIRE DESIGN AND DATA COLLECTION

An online self-administered survey questionnaire – which was prepared using Google documents – consisting of 12 closed-ended and open-ended questions was prepared to assess the use of herbal and alternative therapies for the prevention and treatment of COVID-19. Prior to sharing of the questionnaires for data collection, a pilot study was conducted to test the validity of the content and reliability of the questions with both experts and members of the general public Results from this pilot study were used to improve the questions in terms of semantics and comprehension. The survey was shared through online platforms (Email, Facebook, WhatsApp and We chat). The questionnaire had a brief introduction about the purpose of the study and clearly stated that participation means informed consent. All the responses from the completed questionnaires were recorded. No personally identifiable information was collected or stored.

In the questionnaire, participants were asked of their COVID-19 status, knowledge of the herbs being used for COVID-19 prevention and treatment, use of the herbs and attitude towards the herbs being used. The survey also collected demographic information (age, sex, nationality, education, and occupation), questions related to COVID-19 status, reason for usage of herbs, and the influence of COVID-19 on the personal usage and belief of herbs were included in the questionnaire. Completion of the survey questionnaire was voluntary for anyone who could understand English. The study excluded those who were illiterate, those who could not understand English, were visually impaired, mentally challenged or under 18 years of age.

DATA ANALYSIS

All the responses and information collected from participants was summarized and entered into the Microsoft Excel sheet, and results were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23.0. Descriptive analysis was used for summarizing demographic characteristics of respondents. Chi-square analysis was used to determine statistical association between use of herbal medicine and covariates and multivariate logistic regression was used to analyze factors influencing the use of herbal medicines. Statistical significance was measured at 5% ($p < 0.05$).

RESULTS

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The study had a total of 380 respondents from four African countries. The demographic characteristics of respondents is summarized in (Table 1). 65% of respondents were female. Majority of respondents were young, aged less than 39 years with the age

group of 30-39 (38.9%) dominating. Pertaining to religion, 352 (92.6%) of respondents are Christians. Most of respondents are educated up to university degree 273 (71.8), hence majority are employed 236 (61.8) By the time of this survey, two respondents (one from South Africa and one from Tanzania) tested positive for COVID-19, while 13 (3.4%) respondents had someone in close contact who tested positive.

BELIEF IN- AND USAGE OF HERBS

As summarized in (Table 2), in each country more than 90% of respondents believe in herbal medicines and more than 80% have used them before for either prevention or treatment of diseases. When asked to offer their opinion on what type of medication works better – between western and herbal medication, majority of respondents were in favor of both types. However, when the two types of medications are compared alone, a higher proportion of respondents were in favor of herbal medicines (n=102; 26.8%)

than western medicine (n=23; 6%).

Specific to COVID-19, the survey asked whether respondents have any knowledge on the herbal medicines suitable for the pandemic. Surprisingly, majority of respondents reported to have knowledge of herbs that they believed to be suitable for the pandemic. The highest proportions being from Lesotho (91.4%) and Tanzania (93.4%). Similarly, the highest proportions of respondents from Lesotho (89.5%) and Tanzania (91.8%) have thought of using herbal medicines for COVID-19. When asked whether they have already used some of the herbs, more than 50% of respondents from Lesotho, South Africa and Tanzania admitted to have used the herbs. The highest proportion was among Tanzanians (73.8%) and the lowest was among Ghanaians (42.6%). In addition, majority of respondents were ready to recommend the herbs they know or used to others for prevention or treatment of COVID-19.

Table 1: Demographic characteristics of the study population

Demographic parameter	Total (N=380)	Ghana (N=94)	Lesotho (N=152)	South Africa (N=73)	Tanzania (N=61)
Age group					
<20	15 (3.9)	9 (9.6)	4 (2.6)	1 (1.4)	1 (1.6)
20-29	139 (36.6)	41 (43.6)	36 (23.7)	37 (50.7)	25 (41.0)
30-39	148 (38.9)	35 (37.2)	59 (38.8)	21 (28.8)	33 (54.1)
40-49	64 (16.8)	6 (6.4)	43 (28.3)	14 (19.2)	1 (1.6)
Above 50	14 (3.7)	3 (3.2)	10 (6.6)	0 (0.0)	1 (1.6)
Sex					
Male	133 (35)	35 (37.2)	43 (28.3)	31 (42.5)	24 (39.3)
Female	247 (65)	59 (62.8)	109 (71.7)	42 (57.5)	37 (60.7)
Religion					
Christian	352 (92.6)	89 (94.7)	148 (97.4)	69 (94.5)	46 (75.4)
Muslim	20 (5.3)	5 (5.3)	0 (0.0)	0 (0.0)	15 (24.6)
Buddhist	2 (0.5)	0 (0.0)	2 (1.3)	0 (0.0)	0 (0.0)
None	3 (0.8)	0 (0.0)	0 (0.0)	3 (4.1)	0 (0.0)
Other	3 (0.8)	0 (0.0)	2 (1.3)	1 (1.4)	0 (0.0)
Education					
High school	25 (6.6)	17 (18.1)	4 (2.6)	4 (5.5)	0 (0.0)
College	82 (21.6)	8 (8.5)	36 (23.7)	23 (31.5)	15 (24.6)
University	273 (71.8)	69 (73.4)	112 (73.7)	46 (63.0)	46 (75.4)
Occupation					
Student	67 (17.6)	34 (36.2)	17 (11.2)	9 (12.3)	7 (11.5)
Employed	235 (61.8)	47 (50.0)	111 (73.0)	44 (60.3)	33 (54.1)
Self-employed	42 (11.1)	7 (7.4)	14 (9.2)	3 (4.1)	18 (29.5)
Unemployed	36 (9.5)	6 (6.4)	10 (6.6)	17 (23.3)	3 (4.9)
COVID-19 status					
I tested positive	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.6)
Someone in close contact tested positive	13 (3.4)	1 (1.1)	2 (1.3)	1 (1.4)	9 (14.8)
I and someone in close contact tested positive	2 (0.5)	0 (0.0)	0 (0.0)	1 (1.4)	1 (1.6)
Not tested	364 (95.8)	93 (98.9)	150 (98.7)	71 (93.7)	50 (82.0)

Table 2: Beliefs and practices on the use of herbal medicine for the prevention and treatment of COVID-19 in different countries (N=380)

	Ghana N (%)	Lesotho N (%)	South Africa N (%)	Tanzania N (%)	χ2	P
Do you believe herbal medicines?					7.359	0.04
Yes	93 (98.9%)	148 (97.4%)	71 (97.3%)	55 (90.2%)		
No	1 (1.1%)	4 (2.6%)	2 (2.7%)	6 (9.8%)		
What works better?					15.322	0.015
Western medicine	8 (8.5%)	8 (5.3%)	1 (1.4%)	6 (9.8%)		
Herbal medicine	33 (35.1%)	37 (24.3%)	13 (17.8%)	19 (31.1%)		
Both	53 (56.4%)	107 (70.4%)	59 (80.8%)	36 (59.0%)		
Used any herbs before?					0.332	0.956
Yes	79 (84.0%)	131 (86.2%)	62 (84.9%)	53 (86.9%)		
No	15 (16.0%)	21 (13.8%)	11 (15.1%)	8 (13.1%)		
Know any herbs for prevention or treatment of COVID-19					21.669	<0.001
Yes	68 (72.3%)	139 (91.4%)	64 (87.7%)	57 (93.4%)		
No	26 (27.7%)	13 (8.6%)	9 (12.3%)	4 (6.6%)		
Thought of using herbs for COVID-19?					31.438	<0.001
Yes	64 (68.1%)	136 (89.5%)	48 (65.8%)	56 (91.8%)		
No	30 (31.9%)	16 (10.5%)	25 (34.2%)	5 (8.2%)		
Used any herbs for COVID-19?					15.017	0.002
Yes	40 (42.6%)	77 (50.7%)	39 (53.4%)	45 (73.8%)		
No	54 (57.4%)	75 (49.3%)	34 (46.6%)	16 (26.2%)		
Can you recommend the herbs you used to others?					11.124	0.07
Yes	64 (68.1%)	122 (80.3%)	52 (71.2%)	50 (84.7%)		
No	4 (4.3%)	3 (2.0%)	4 (5.5%)	3 (5.1%)		
Maybe	26 (27.7%)	27 (17.8%)	17 (23.3%)	6 (10.2%)		

Table 3: Multivariate logistic regression of the factors influencing the use of herbal medicines for COVID-19

Variables	Odds Ratios (OR)	95% Confidence interval (CI)	P value
Country			
Ghana	Reference		
Lesotho	1.291	0.731–2.280	0.378
South Africa	1.731	0.870–3.443	0.118
Tanzania	3.625	1.624–8.094	**0.002**
Occupation			
Student	Reference		
Employed	0.813	0.443–1.491	0.503
Unemployed	1.174	0.474–2.910	0.729
Self employed	0.394	0.157–0.992	**0.048**
Belief in herbal medicine			
No	Reference		
Yes	5.537	1.223–25.079	**0.026**
Know herbs for COVID-19			
No	Reference		
Yes	2.883	1.454–5.719	**0.002**

FACTORS INFLUENCING THE USE OF HERBAL MEDI-CINES FOR COVID-19

Multivariate logistic regression showed that most respondents used herbs for COVID-19 because of either their nationality as majority were Tanzanians (OR=3.625; 95%CI 1.624 – 8.094, p=0.002), self-employed (OR=0.394; 95%CI 0.157 – 0.992, p=0.048), believed in herbal medicine (OR=5.537; 95%CI 1.223 – 25.079, p=0.026) or know herbs that they believe to be suitable for COVID-19 (OR=2.883; 95%CI 1.454–5.719, p=0.002).

HERBS MOSTLY USED FOR COVID-19

Herbs that were frequently reported by respondents are summarized in (Figure 1). Lemon (43.7%) and ginger (40.8%) were the most used herbs followed by garlic (32.9%). Although steaming itself is not an herb, it was reported by respondents because they add mixture of herbs to the steaming water. The herbs summarized in the figure are not the only ones mentioned but they are the ones that were commonly mentioned in the survey.
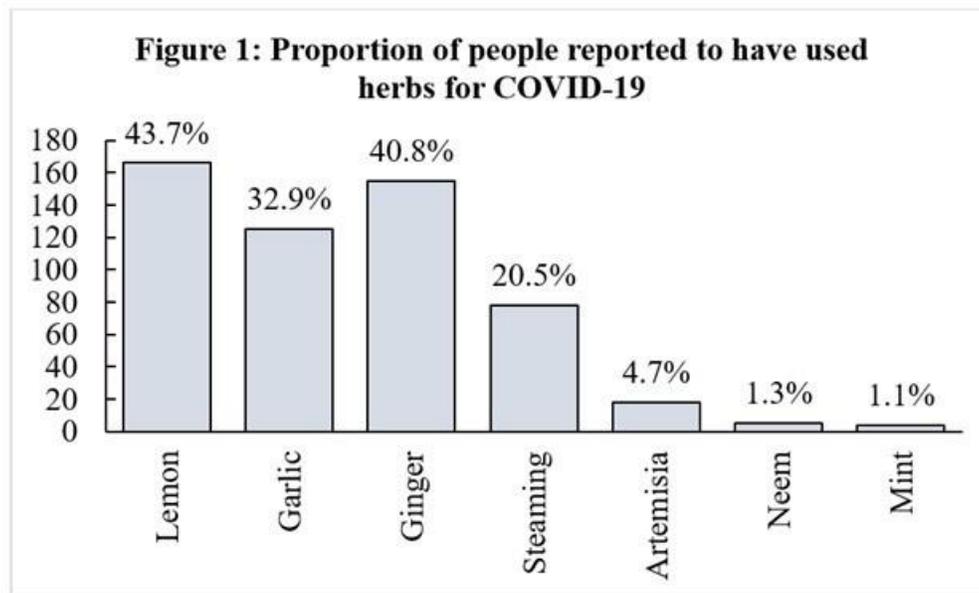

Figure 1: Proportion of people reported to have used herbs for COVID-19

DISCUSSION

During the COVID-19 pandemic desperate people from the four African counties opted to use the little knowledge they have on herbs to come out with herbs that they thought could be helpful. People's belief on herbs was high as compared to western medicine, may be, it was due to long duration of the pandemic that they have survived without a vaccine or medicine for COVID-19. The use of herbs during the pandemic was associated with their occupation, belief on herbs and knowledge of herbs believed to be suitable for COVID-19. Lemon, ginger, garlic and artemisia were commonly used among the study population. We will discuss the scientific basis of their decision and rationale for use for Coronavirus disease.

Allium sativum, commonly known as garlic, has not only been used for centuries in traditional medicine to treat various disorders but also used in food preparation as a spice and is believed to con- tain over 2000 biologically active substances [10]. In recent years there has been an increasing research into garlic and studies are reporting that the consumption of garlic reduces the risk of some cancers [11] and it is anti-inflammatory and antimutagenic [12]. It

its prophylactic use may decrease the frequency of colds in adults

strengthens the immune system to prevent cold and flu symptoms,

and the effects of garlic result from the presence of sulfur-containing compounds which mobilizes the body's immune system against infectious agents through increased proliferation of lym- phocytes [10,13]. It is this immunomodulatory property of garlic that users might be benefiting when using it for COVID-19 treat- ment because there reports that the disease impair lymphopoiesis as well as increase lymphocyte apoptosis [14,15].

Historically, ginger (Zingiber officinale) is commonly known to treat nausea, colds, flu and vomiting. Interestingly, 15%- 39% of COVID-19 patients presented with nausea and vomiting symp- toms [14]. Ginger has been proven to be anti-inflammatory, pro- tecting the lungs from severe damage caused by inflammation [16] through inhibition of interleukin-1 (IL-1) [13] which is elevated in COVID-19 patients [14]. Ginger is also reported to have an- ti-fibrotic effect [17] and pulmonary fibrosis is reported to be a possible pulmonary complication in COVID-19 patients [18]. The active component of ginger – gingerol – has been proven to be re- sponsible for broncho-relaxation [19] and has been recommended for use as an anti-inflammatory drug in respiratory infections [20]. Therefore, the use of ginger for COVID-19 might have been useful

for relief against its symptoms.

Artemisia is a genus consisting of over 500 species distributed worldwide and has been used traditionally as medicine and has been proven by research to be antibacterial, antimalarial, antifungal and possesses many more biological properties [21]. Artemisia afra – a common species in Africa that is commonly used for respiratory conditions [22] – has been shown to modulate pulmonary inflammation [23] and has also been shown to be effective in the treatment of tuberculosis [24]. Artemisia annua on the other hand is also used in some parts of Africa and India, and its main component – artemisinin – is used for malaria treatment and is being explored for its activity in lung cancers and respiratory inflammation [25,26]. The use of *A. annua* for COVID-19 has also been investigated and reviewed extensively [26–30]. Studies suggests that, artemisinins have the ability of attenuating proliferation, inflammation, invasion, and metastasis, and in inducing apoptosis. Therefore, the use of artemisia by respondents from African countries might have been effective in protecting them against symptoms of the disease.

Azadirachta indica, commonly known as neem, is a medicinal tree widely used in India and other parts of Africa for its varied medicinal properties [31]. Neem leaves have been proven to exhibit a wide range of medicinal properties such as antiviral, anti-fungal, anti-malarial, antihypertensive and can also be used as an insecticide [32]. Neem leaf extract reduce the infiltration rate of inflammatory cells (macrophages and neutrophils) in broncho-alveolar lavage fluid, facilitates the release pro-inflammatory cytokines preventing lung injury [33]. Nimbolide which is one of the active components of neem was found to be effective against autopha-gy related to pulmonary fibrosis [34]. A computational prediction of small molecule inhibitors of SARS-CoV-2 Membrane (M) and Envelope (E) proteins in neem, identified compounds which displayed strong binding and interactions with E and M regions and the prediction showed the compounds to have good pharmacokinetic properties [35] On the other hand, the active constituents of *A. indica* are also suggested to be potentially target SARS-CoV-2 by hindering its replication process [36] and some compounds exhibited a better inhibition potential when compared with the USA Food and Drugs Administration (FDA) reference anti-viral drugs (Ribavirin, remdesivir and hydroxychloroquine) [37]. Therefore, neem extracts might be containing compounds that might be useful against COVID-19 that might have helped users from this study.

Mint or the genus mentha is grown worldwide and used for food flavorings and as traditional medicine for colds and coughs [38]. Peppermint (Mentha×piperita) which belongs to the genus mentha is said among others to have antimicrobial and antiviral properties [39]. It has been identified as the second most common plant used as anti-influenza in Turkey [40]. Therefore, its anti-viral potential might also be useful against COVID-19.

The lemon, Citrus limon, is the third most important citrus fruit in the world that are rich in, among others, flavonoids, dietary fiber, vitamins and carotenoids [41]. These components are particularly important for their role in preventing diseases such as cancer, cardiovascular diseases and diarrhea [42–44]. Lemon also contains hesperidin and ascorbic acid (Vitamin C) [41] which hinder cell damaging effects of the oxygen free radicals precipitated by virus infection and inflammation [45]. Vitamin C is popularly known to inhibit oxidation and its consumption is known to enhance most of the immune system parameters [46]. It is also a promising treatment for lung fibrosis via TGF-β-a pro-fibrotic mediator and the collagen deposition [47]. A study on naringenin, a citrus-derived flavonoid, revealed that it inhibit SARS-CoV-2 3-chymotryp- sin-like protease (3CLpro) and reduce angiotensin converting enzyme receptors activity [48] which are promising for COVID-19 treatment.

Steaming is a form of treatment where medicinal plants are added into water and the water is heated to or beyond boiling point and then an individual soaks in and inhales the steam. Sauna baths can be regarded as a form of steaming and some cohort studies suggest that the higher frequency of sauna bathing may be associated with a low risk of respiratory diseases [49], reduces the risk of pneumonia [50] and improves lung function [51]. Furthermore, inhalation of steam produced from water infused with turmeric and tulsi is said to be effective against respiratory conditions [52].

CONCLUSION

The lack of definite medicine for prevention and/or treatment for COVID-19 for a long-time influenced people from African countries to turn to herbal medicine. They were confident with the herbs that they used to rely on for other respiratory diseases like ginger, garlic, neem, artemisia, mint, lemon and steaming. Surprisingly, there is some scientific background to support their choice, and for some herbs, researches have been conducted and proved some therapeutic effect against SARS-CoV-2. It is therefore not bad to encourage people to try contemporary medicines in situations when western medicines are not yet available. This might be the reason why, so far, Africa is less hit by the disease.

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