PEOPLE'S PERCEPTION ON THE USE OF SPICES AND HERBS IN THE MANAGEMENT/ MITIGATION OF COVID -19 INFECTION

[1]*Adesetan, Titilayo Oyeronke; [1]Efuntoye, Moses Olusola; [2]Lawal, Olusegun Adebayo; [3]Feyisola, Roseline Tolulope; [1]Oyeyipo, Funmilayo Mujidat; [1]Koko, Sulaimon and [1]Adekunle, Rukayat A.

[1]Department of Microbiology, Olabisi Onabanjo University, PMB 2002, Ago-Iwoye.

[2]Department of Applied Zoology and Environmental Science, Olabisi Onabanjo University, PMB 2002, Ago-Iwoye.

[3]Department of Plant Science, Olabisi Onabanjo University, PMB 2002, Ago-Iwoye.

*Corresponding author: titilayo.adesetan@oouagoiwoye.edu.ng

ABSTRACT

The lack of definite treatment for COVID-19 during the pandemic led to the search for alternative treatments such as herbs and spices. This study aimed to sample people's opinion on the use of herbs and spices in the prevention/management of COVID-19 infection. An online questionnaire was designed with Google forms and administered via WhatsApp in August 2020 and February 2021. The questionnaire consists of 19questions; Seven (7) have to do with the demography while the remaining 12questions are on the health benefits of herbs and spices and people's opinion on their uses in the management of COVID-19. Five hundred and sixty-four responses were received. From the responses, 95.3% knew herbs and spices, 69.1% stated that there was an increase in the consumption of spices during the pandemic, 70.4%of the respondents took spices in the form of soup while 79.6% have used it to relieve symptoms of illnesses like cold, fever, cough and sore throat. On the health benefits of spices, 81.9% were aware of their health benefits,82.6% believed they could boost the immune system, while 83.7% and 72% believed they could relieve symptoms related to COVID-19 and help in the management of COVID-19 symptoms. Ginger, garlic and turmeric are the three top herbs and spices being taken by the respondents; ginger, garlic, lemon grass and scent leaves were the most chosen spices and herbs that can manage COVID-19 symptoms. This research thus has revealed that people used spices and herbs to prevent and manage COVID-19 during the pandemic; their use should further be encouraged because of their health benefits.

Key words: COVID-19, questionnaire, spices and herbs

Accepted date: 21 November, 2021

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) responsible for COVID-19 pandemic was first identified in Wuhan, China (Zhu *et al*., 2020). More than 197 million cases have been reported worldwide as of 28th September 2021 with over 4.2 million deaths (WHO, 2021),with sub-Saharan Africa remarkably lower than The Americans, Europe and Asia (Ezeh *et al*., 2021). As of 4th August 2021, Nigeria had 176,011confirmed cases with 2,167 deaths (NCDC, 2021). The time from exposure and onset of symptom is generally between 2 and 14 days, with an average of 5 days. Some of the signs include sneezing, cough, fever and shortness of breath. Complications may include pneumonia, throat pain and acute respiratory distress syndrome(Ahmad *et al*., 2020). The recommended measures of protection include frequent washing of hands with soap, covering of the mouth when coughing in public, maintaining 1-meter distance from other people (Velavan *et al.*, 2020) and using hand sanitizers when soap and water are not available. Four different vaccines are now available for administration: Pfizer-BioNTech, Moderna vaccine, Janssen/Johnson and Johnson vaccine, and Oxford -Astra Zeneca (Mayo Clinic, 2021);only the first three were accepted for use in the United States (CDC, 2021).

Diagnosis is made by detecting SARS-CoV-2 via reverse transcription polymerase chain reaction

testing, although 20% to 67% of patients test results may occur as false-negative; however, this depends on the quality and timing of testing. More than 75% of patients hospitalized with COVID-19 require supplemental oxygen (Wiersinga *et al*., 2020).

Spices are used in food to improve the aroma and flavor, they are also important due to their therapeutic, antimicrobial and antioxidant properties (Joe *et al*., 2009; Das *et al*., 2012). Sofia *et al*. (2007) reported that natural herbs and spices are consumed either in food or used as medicine in India. There are no known side effects associated with long term consumption of herbs and spices; they are one of the harmless and effective medications used in treating various diseases(Sunilson*et al*., 2009). The governor of Oyo state in Nigeria, in an interview on how he recovered from coronavirus, said he used black seed oil with honey in the morning and night, which according to him boosted his immunity (Premium Times, 2020).

There is also the believe that COVID-19 can be managed with spices since its symptoms are similar to common cold which has been treated with common spices that have antimicrobial activity. Therefore, there is need for this research to be conducted to know people's views and opinions about the use of spices and herbs in the management of COVID-19 symptoms since there is no known treatment for the disease yet.

Method

Study design

We searched online for journals that have published similar work on the topic to use as a guide but we could not get any. Therefore, online questionnaires were administered with Google and Microsoft docs in August 2020 and February 2021. The survey consisted of an online questionnaire that was sent via WhatsApp only. The questionnaire was made anonymous for data confidentiality.

The survey included 19 questions, 7 were demographic questions, 1was on the source of information during the pandemic, 11 were on the recognition and health benefits of spices in the management of COVID-19 and other illnesses.

The questions on demography included age, sex, marital status, religion, level of education, job/occupation and place of residence. The respondents were asked how they obtained information during the pandemic, if they recognised spices, the type of herbs and spices being taken, they were also asked if there was an increase in consumption of spices during COVID-19 pandemic. They were asked the forms in which they take herbs and spices. They were asked about their awareness of the health benefits of herbs and spices, their ability to boost immune system against COVID-19 and their ability to relieve symptoms of some illnesses. They were further asked about their perception of the ability of herbs and spices to relieve symptoms related to COVID-19. In addition, they were asked the type of llness(es) that has been managed with the help of herbs and spices, if they can help in the management of COVID-19, relieve symptoms related to COVID 19 and finally to choose those herbs and spices that can manage COVID-19 symptoms among the 22 listed plants.

Results

Five hundred and sixty-four (564) responses were received. The demography of the respondents is presented in Table 1. Most of the respondents are in the age bracket 18 – 35 years and 349 were female while 214 were male. Three hundred and forty-two (342) were single, 203 married, 15 divorced and three widowed. Sixty-seven percent of the respondents are Christians, 31% Muslim and 2% traditional worshippers. For the responses on degree of Education, 288 respondents had B.Sc., followed by M.Sc. with 87 responses, while the least was OND with a response. Out of the 562 responses on job/occupation, 292were employed, 45were unemployed while the rest were students. Four hundred and eighty-seven of the respondents reside in the south-west, Nigeria while 17 are in diaspora. Most of the information on herbs and spices were gotten from social media, followed by internet and family (fig 1). Many of the respondents (538) know what herbs and spices are (fig 2) while fig 3 showed the type of spices the respondents have taken in the past. There was an increase in the intake of spices by the respondents during COVID-19 outbreak (fig 4). Most of the respondents take herbs and spices in soup (fig 5). Four hundred and sixty-tworespondents are aware of the health benefit of herbs and spices (fig 6). Four hundred and sixty-six respondents believed that spices and herbs can boost immune system while 473 said they have used them to relieve symptoms related to

COVID-19 (figs 7 and 8). Four hundred and forty-nine respondents (449) have used them in the past torelievesymptomsof someillnesses(fig 9); cold, fever, cough, sore throat have been managed with spice and herbs (fig 10). Seventy-two(72) percent believed that herbs and spices could be used to manage COVID-19 symptoms (fig 11). Ginger and garlic were chosen as the most effective in managingof COVID-19 (fig 12).

Table 1: Demographic study of respondents

Description	Number of Respondents
Age	
18 – 25 years	274
26 – 35 years	128
36 – 45 years	94
46 – 55 years	52
56 – 70 years	11
> 70 years	2
No response	3
Total	564
Sex	
Male	214
Female	349
No response	1
Total	564
Marital Status	
Single	342
Married	203
Divorced	15
Widowed	3
No response	1
Total	564

Religion	
Christian	376
Muslims	175
Traditional	9
Others	3
No response	1
Total	564
Level of Education	
Ph. D	43
B.Sc	286
HND	40
M.Sc	87
OND	1
NCE	9
PGD	2
Undergraduate	55
SSCE	40
No response	1
Total	564
Job/Occupation	
Employed	292
Unemployed	45
Student	225
No response	2
Total	564
Residence	
South West	487
East	20
North	28
Diaspora	17
No response	12
Total	564

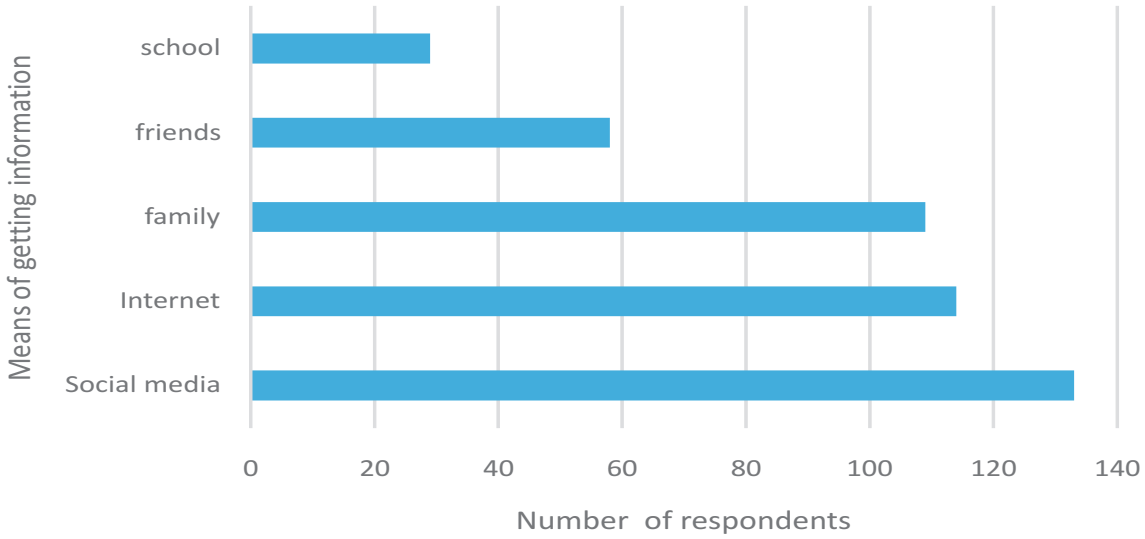

Fig 1: Means of obtaining information by respondents during the pandemic

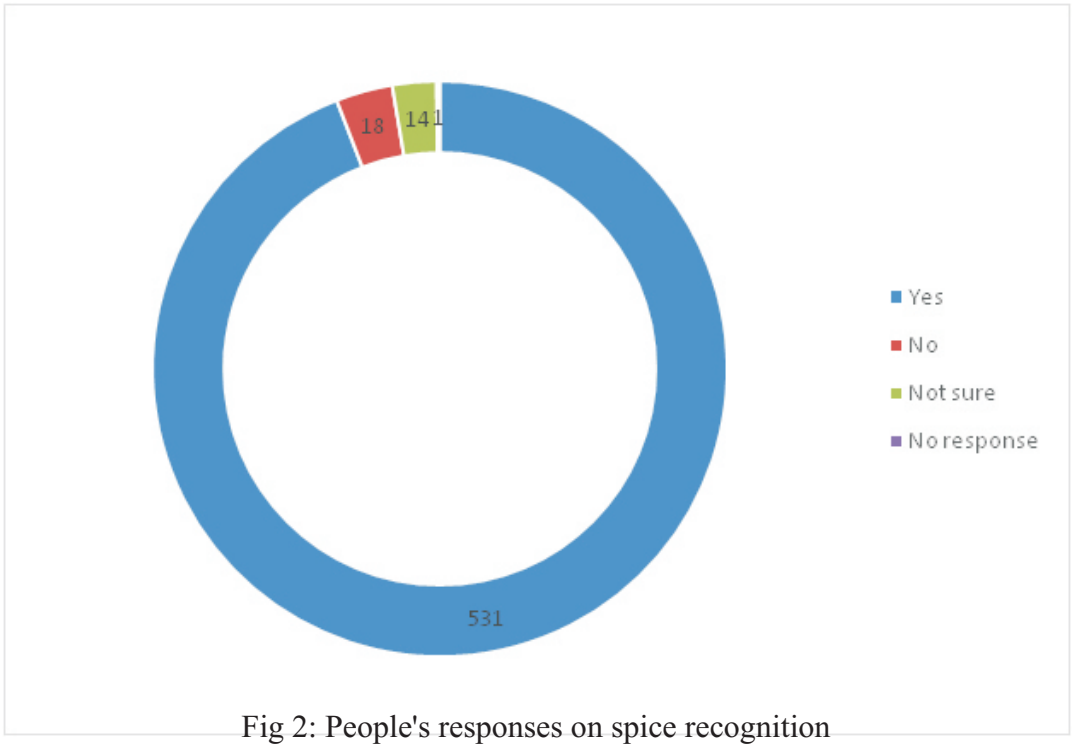

Fig 2: People's responses on spice recognition

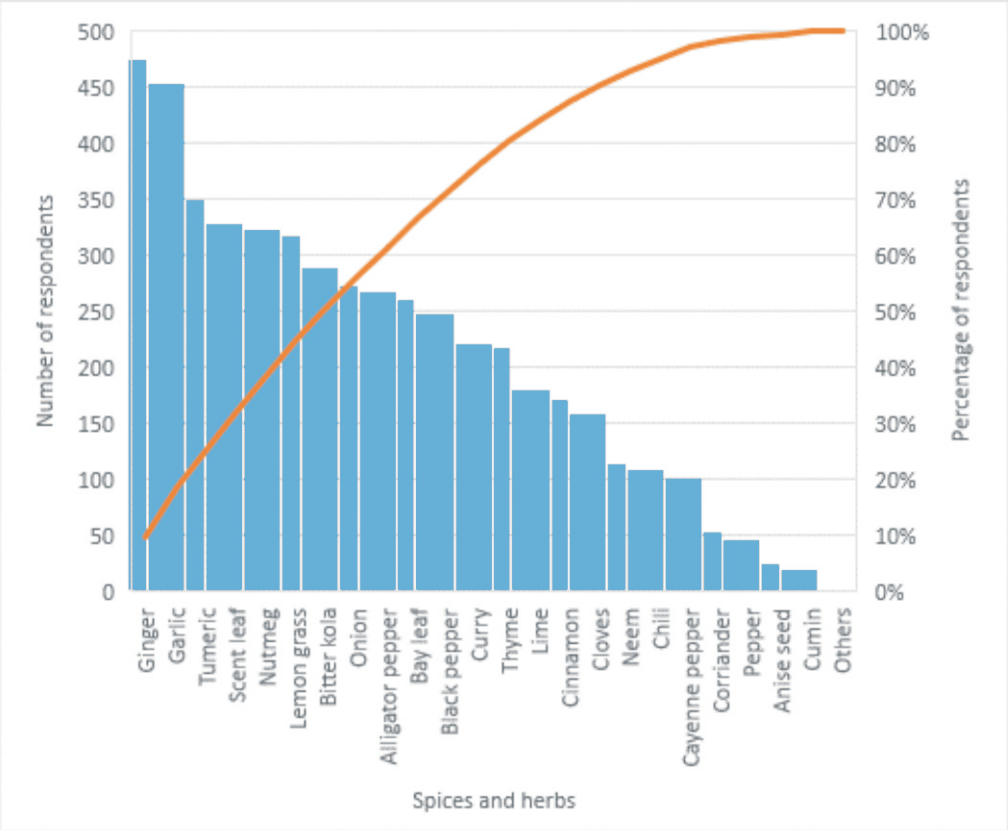

Fig 3: People's responses on the type of herbs and spices that are being taken

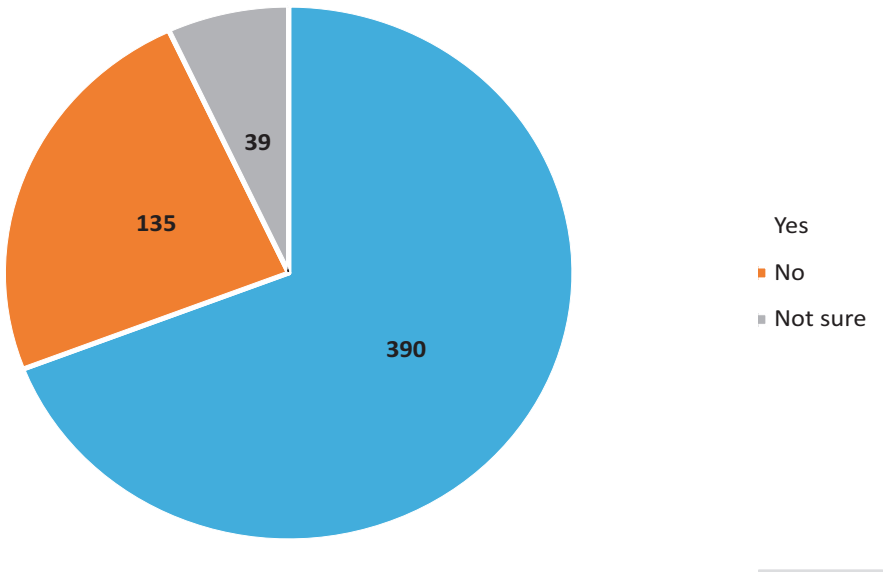

Fig 4: Response to if there was an increase in consumption of spices during COVID 19

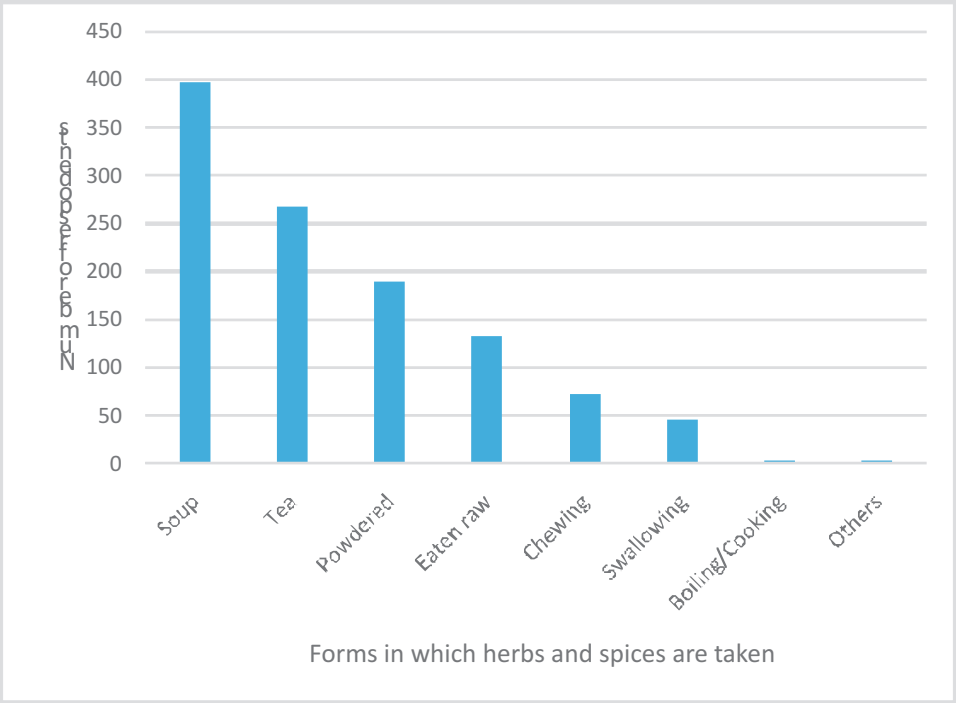

Fig 5: Forms in which herbs and spices are taken

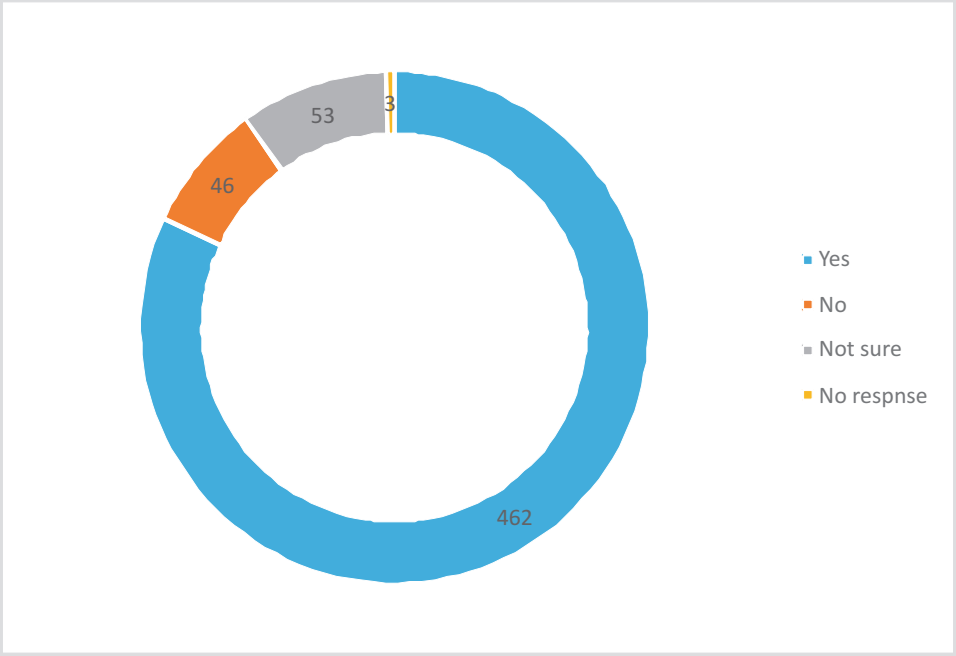

Fig 6: Responses on awareness on the health benefits of herbs and spices

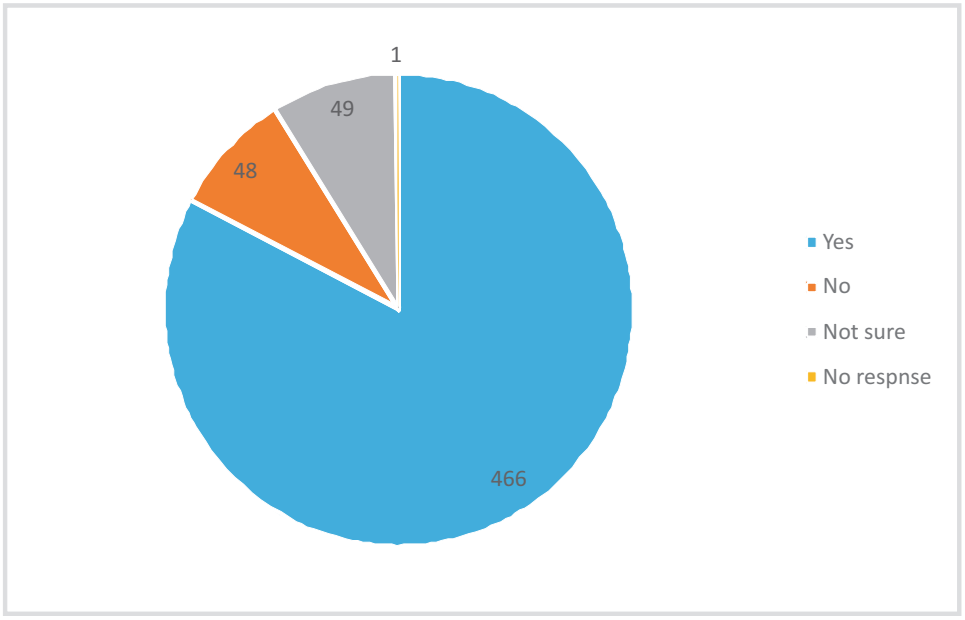

Fig 7: People's perception on the ability of herbs and spices to boost immune system against COVID-19

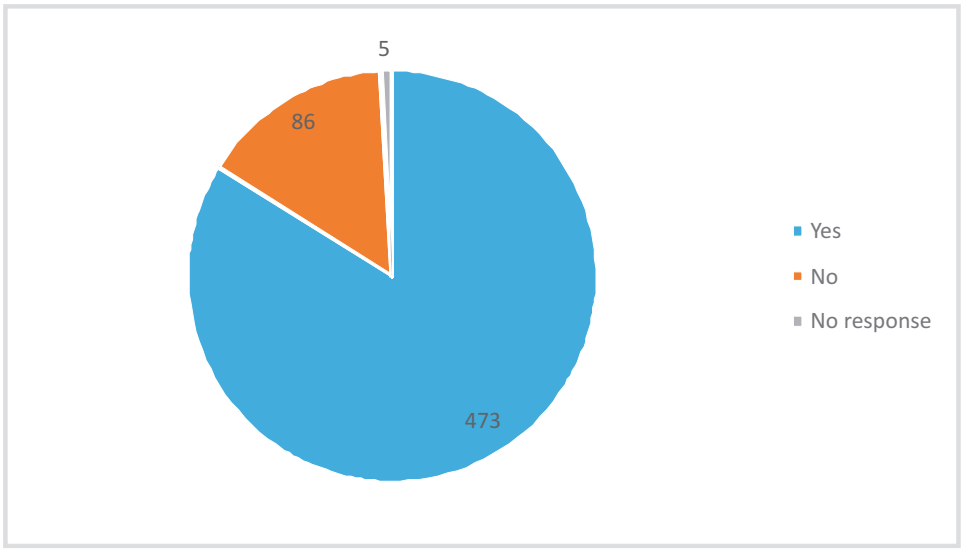

Fig 8: People's perception on the ability of herbs and spices to relieve symptom related to COVID 19

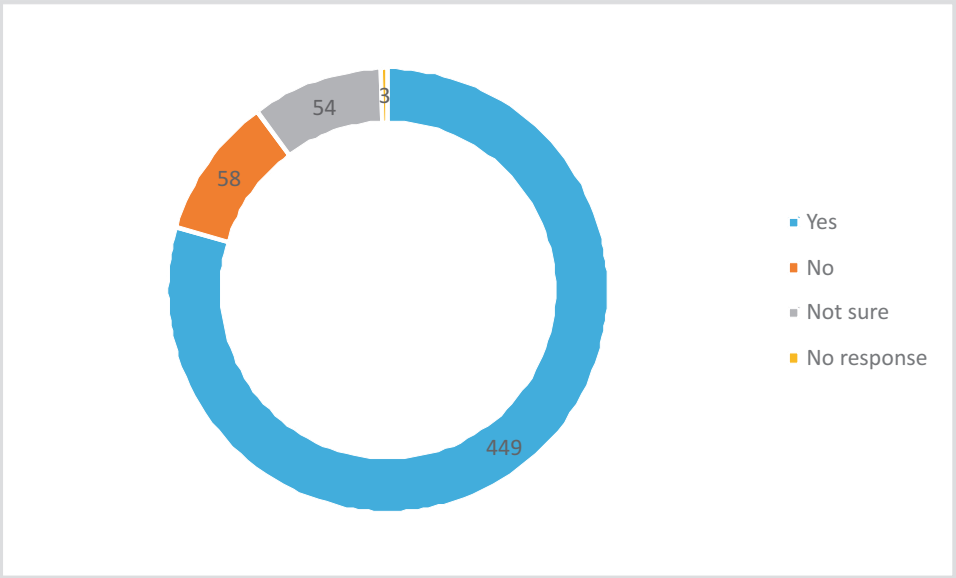

Fig 9: People's response on the use of herbs and spices torelieve symptoms of some illnesses

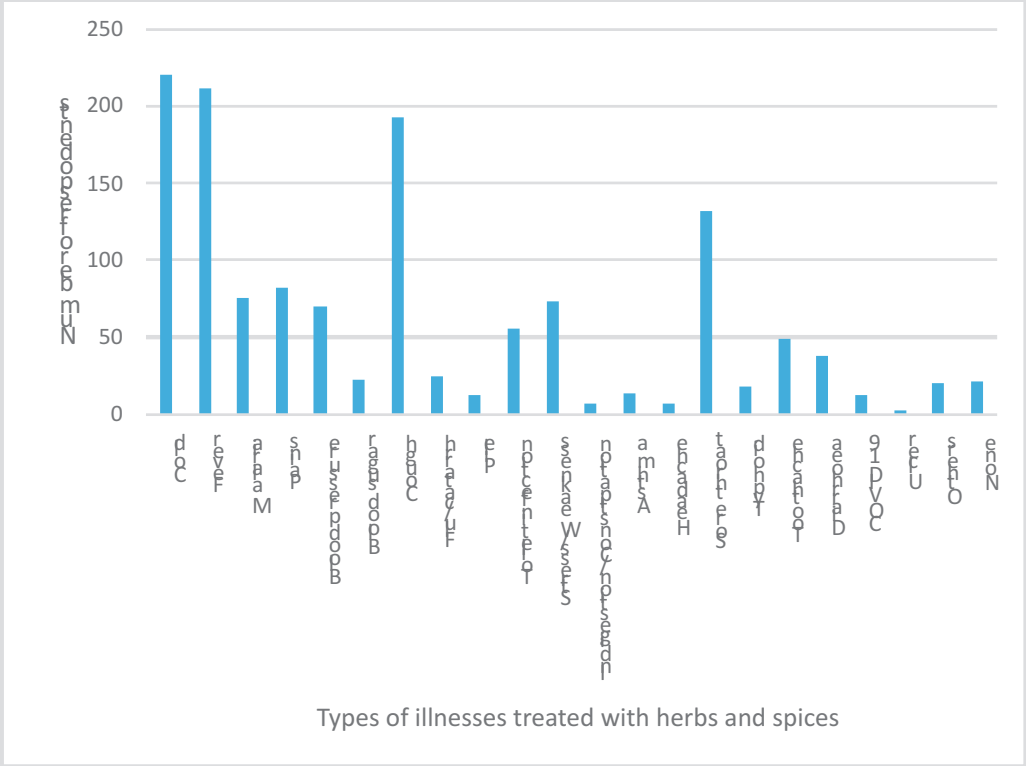

Fig 10: Responseson type of illness(es) managed with the help of herbs and spices

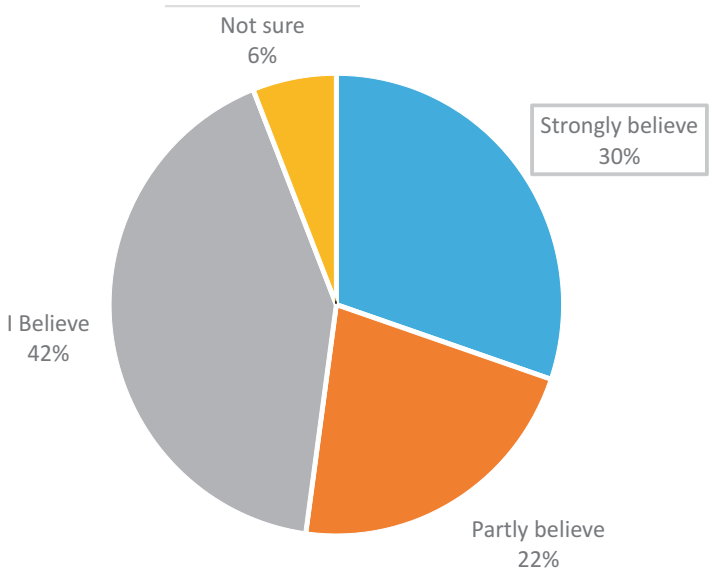

Fig 11: Responses on if spices and herbs can help in the management of COVID-19 symptoms

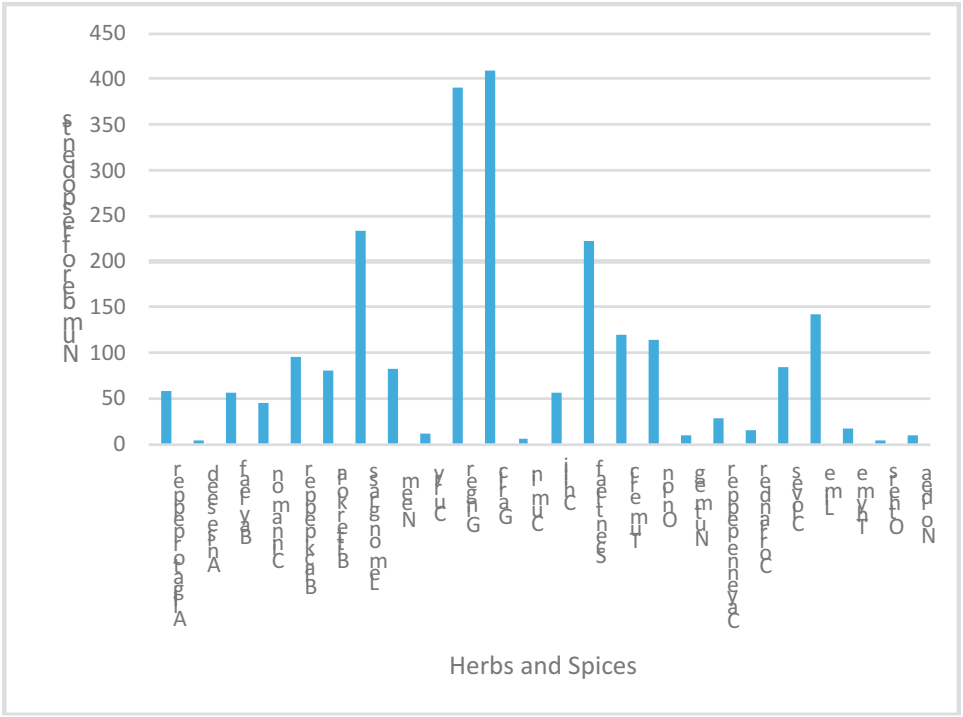

Fig 12: Responseson herbs and spices that can manage COVID-19 symptoms

Discussion

Spices are well known for their antioxidant and therapeutic properties. Spices like black pepper, neem, basil, garlic, ginger, clove, cinnamon, turmeric are known to possess antiviral properties (Singh *et al.,* 2021).

In this research, majority of the respondents are female, and had higher education and many are residing in southwestern, Nigeria. This aligns with the work of Vinella-Tajeda (2021)who also used a web based cross sectional study where majority of the respondents are female.

All the herbs and spices listed are being taken at least by one of the respondents but the first three spices that were taken by many are ginger, garlic and turmeric. Gupta *et al*. (2013) reported that FDA categorised turmeric as "Generally Recognised as Safe". There was an increase in the consumption of spices and herbs during the pandemic and most of the respondents take them in form of soup and tea.Sah*et al.* (2012) reported that garlic and ginger are the two most common herbs used for therapeutic purposes and cooking;they have exceptional antibacterial properties.Singh *et al.*(2020)stated that there was an increase in the exportation of spices from India during the pandemic.

Most of the respondents have used herbs and spices to relieve some illnesses such as cold, fever, cough, sore throat. Garlic is rich in antioxidant therefore it is used in the treatment of constipation, cough and arthritis; and are known to kill viruses such as adeno virus, SARS-CoV (Mehrbod *et al.,* 2013; Khanal *et al.,* 2018). the predominant oleoresin, piperine found in black pepper can be a potential inhibitor of SARS-CoV-2 (COVID-19) as revealed by a computational study (Chuodhary *et a*l., 2020).

Many of the respondents are aware of the health benefits of the spices, their ability to boost immune system and relieve COVID-19 symptoms. Seventy-two (72) percent of the respondents believed that herbs and spices can help in the management and relieve of symptoms related to COVID 19. Garlic and Ginger were chosen among the spices that can manage COVID-19 symptoms. Singh *et al*. (2021) conducted an online survey on home remedies for COVID-19, 93.6% of the respondents are of the opinion that spices can help in curing and boosting immune system against the virus and other viral infection.

Orisakwe *et al*. (2020) researched on some acclaimed home remedies in which natural spices such as turmeric, garlic, ginger etc. and leaves such as neem, pawpaw, guava, etc. are reported to have notable antioxidant and anti-inflammatory properties. Uchejeso *et al.*(2020) also narrated that garlic, giloy, bitter kola, lime, ginger and turmeric were some of the indigenous plants used during the outbreak because of their anti-COVID 19 properties. Bousquet *et al*. (2021) stated that spices like garlic, ginger, turmeric and cinnamon are some of the NRF2- interacting nutrients that can reduce the severity of COVID-19. It was further reported by these authors that the clinical challenges carried out with curcumin, black pepper, ginger, or green tea (all TRPA1 agonists) and capsaicin (TRPV1 agonist) on COVID-19 patients were tremendously swift. Radhika and Malik (2021) also reported turmeric, black seed and ginger as some of the spices used as home remedies in North India.

According to several researches, spices have different activities against different virus; ginger inhibits cytopathic effect and cell viability in chikungunya virus (Sulochana *et al.,* 2020), garlic extract was potent against SARS-CoV-1 multiplication *in vivo* (Shojai *et al.,* 2016), cinnamaldehyde, an essential compound in cinnamon inhibits the replication of T2 bacteriophage (Goldstein and Shumakar, 2019), extract of clove was effective against feline calici virus (Aboubakr *et al.,* 2016), quercetin, one of the main compounds in onion inhibited SARS-CoV-1 by preventing its attachment to host cells (Chen *et al*., 2006), curcumin in turmeric stops virus uptake and replication (Dai *et al.,* 2018), neem terpenoids inhibited membrane and envelope development in SARS-CoV-2 (Borkotoky and Banerjee, 2020).

Conclusion

This study has revealed that many people are taking spices because of their health benefits and belief that they can be used in boosting the immune system against COVID-19 infection since spices have been used to treat illnesses similar to COVID-19.

Recommendation

The use of spices should be encouraged at this time to help mitigate the effect of COVID 19 infection as much as possible since they have been reported to have therapeutic effect. Moreso, spices are readily available in the local markets and do not have any known side effects (if the right doses are taken) rather they boost the immune system against infections by pathogenic organisms and the easy way to improve one's health.

References

Aboubakr, H. A., Nauertz, A., Luong, N. T., Agarwal, S., El-Sohaimy, S.,Youssef, M. M. & Goyal, S. M. (2016). *In vitro* antiviral activity of clove and ginger aqueous extracts against feline calicivirus, a surrogate for human norovirus. Journal of Food Protection, 79(6), 1001–1012.https://doi.org/10.4315/0362-028X.JFP-15-593

Ahmad, S., Hafeez, A., Siddqui, S. A., Ahmad, M. & Mishra, S. (2020). A Review of COVID-19 (Coronavirus Disease-2019) Diagnosis, Treatments and Prevention. *Eurasian Journal of Medicine and Oncology*, 4(2):116–125.

Borkotoky, S., & Banerjee, M. (2020). A computational prediction of SARSCoV-2 structural protein inhibitors from *Azadirachtaindica* (Neem).*Journal of Biomolecular Structure and Dynamics*, 1–17. https://doi.org/10.1080/07391102.2020.1774419.

Bousquet, J., Czarlewski, W., Zuberbier, T., Mullol, J., Blain, H., Cristol, J-P., De La Torre, R., Le Moing, V., Lozano, N.P., Bedbrook, A., Agache, I., Akdis, C.A., Canonica, G.W., Crutz, A.A., Fiocchi, A., Fonseca, J.A., Fonseca, S., Gemicioglu, B., Haahtela, T., Iaccarino, G., Ivancevich, J.S., Jutel, M., Klimek, L., Kuna, P., Larenas-Linnemann, D.E., Melen, E., Okamoto, Y., Papadopoulos, Pfaar, O., Reynes, J., Rolland, Y., Rouadi, P.W., Samolinski, B., Sheikh, A., Toppila-Salmi, S., Valiulis, A., Choi, H-K., Kim, H.J. & Anto, J.M. (2021). Spices to Control COVID-19 Symptoms: Yes, but Not Only..., *International Archives of Allergy and Immunology*,182(6), 489–495. doi: 10.1159/000513538.

CDC (2021). Types of Vaccines available. Centre for Disease Control and Prevention. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/cifferent-vaccines.html.

Chen, L., Li, J., Luo, C., Liu, H., Xu, W., Chen, G., Liew, O.W., Zhu, W., Puah, C.M., Shen, X. & Jiang, H.(2006). Binding interaction ofquercetin-3-β-galactoside and its synthetic derivatives with SARS-CoV3CLpro: structure–activity relationship studies reveal salient pharmacophore features. *Bioorganic and Medicinal Chemistry*, 14(24), 8295–306. https://doi.org/10.1016/j.bmc.2006.09.01.

Choudhary, P., Chakdar, H., Singh, D., Selvaraj, C., Singh, S.K., Kumar, S.&Saxena, A.K. (2020). Computational studies reveal piperine, the predominant oleoresin of black pepper (*Pipernigrum*) as a potential inhibitor of SARS-CoV-2 (COVID-19). *Current Science* 119 (8), 1333-1342.

Dai, J., Gu, L., Su, Y., Wang, Q., Zhao, Y., Chen, X., Deng, H., Li, W., Wang, G. &Li, K. (2018). Inhibitionof curcumin oninfluenza A virus infection and influenzal pneumonia via oxidative stress, TLR2/4, p38/JNK MAPK and NF-κB pathways. *International Immunopharmacology*, 54, 177–187. https://doi.org/10.1016/j.intimp.2017.11.009.

Das, S., Anjeza C &Mandal S.2012. Synergistic or additive antimicrobial activities of Indian spices and herbal extracts against pathogenic, probiotic and food-spoiler micro-organisms.*International Food Research Journal,*19(3), 1185 - 1191.

Ezeh, A., Siverman, M., Stranges, S. & Adams, J. (2021). The impact of COVID 19 has been lower in Africa. The Conversation. https://theconversation.com/the-impact-of-covid-19-has-been-lower-in-africa-we-explore-the-reasons-16455.

Goldstein, G.& Shumaker, A. G. (2019). Cinnamon extract and cinnamaldehydeinhibit the replication of t2 bacteriophage in *E. coli*: Potential for use in antiviral and anticancer therapy. *Research & Reviews: A Journal of Biotechnology*, 9(3), 8–17.

Gupta, S. C., Patchva, S.& Aggarwal, B. B. (2013). Therapeutic roles of curcumin: Lessons learned from clinical trials. *The American*

Association of Pharmaceutical Scientists Journal, 15(1), 195–218. https://doi.org/10.1208/s12248-012-9,432-8.

Joe, M.M., Jayachitra, J.&Vijayapriya, M. (2009). Antimicrobial activity of some common spices against some human pathogens. *J.Med.Plant Res,*3(11), 1134 -1137.

Khanal, S., Ghimire, P.&Dhamoon, A. S. (2018). The repertoire of adenovirus in human disease: The innocuous to the deadly. *Biomedicines*, 6(1), 30.

Mayo Clinic (2021). Different types of COVID-19 vaccines: How they work. Available at https://www.mayocinic.org/diseases-cnditins/crnavirus/in-depth/different-types-of-covid-19-vaccines/art-20506465.

Mehrbod, P., Ideris, A., Amini, E., Eslami, T., Bande, F.& Kheiri, M. (2013). Assessment of direct immunofluorescence assay in detection of antiviral effect of garlic extract on influenza virus. *African Journal of Microbiology Research*, 7, 2608–2612.

NCDC (2021). Covid-19: Taming the third wave amidst emergence of Delta variant in Nigeria. Weekly Epidemiological Report Week 28. Available at www.ncdc.gov.ng.

Orisakwe, O.E., Orish, C.N. andNwanaforo, E.O. (2020). Coronavirus disease (COVID-19) and Africa: Acclaimed home remedies. *Scientific African* 10 (2020) e00620. https://doi.org/10.1016/j.sciaf.2020.e00620.

Premium Times (2020). How I recovered from Coronavirus. Available at https://www.premiumtimesng.com/news/386347-how-i-recovered-from-coronavirus-seyi-makinde.html.

Radhika, A. G. & Malik, H. (2021). Fight against COVID-19: Survey of Spices and Herbs Used in North India. *Open Journal of Epidemiology*, 11(03), 256–266. doi: 10.4236/ojepi.2021.113022.

Sah, P., Al-Tamimi, B., Al-Nassri, N. & Al-Mamari, R. (2012). Effect of Temperature on Antibiotic Properties of Garlic (*Allium sativum* L.) and Ginger (*Zingiberofficinale* Rosc.). *African Journal of Biotechnology* 11(5):1612-1615.

Shojai, T.M., Langeroudi, A.G., Karimi, V., Barin, A. & Sadri, N. (2016). The effect of *Allium sativum* (garlic) extract on infectious bronchitis virus in specific pathogen free embryonic egg. *Avicenna J Phytomed.* 6 (4), 458-467.

Singh, N. A., Kumar, P., Jyoti&Kumar, N. (2021). Spices and herbs: Potential antiviral preventives and immunity boosters during COVID-19. *Phytotherapy Research*, 35(5), 2745–2757. doi: 10.1002/ptr.7019.

Sofia, P.K., Prasad, R., Vijay, V.K.& Srivastava, A.K. (2007). Evaluation of antibacterial activity of Indian spices against common foodborne pathogens. *International Journal of Food Science and Technology*, 42, 910-915.

Sulochana, K., Jangra, G., Kundu, V., Yadav, J. P.& Kaushik, S. (2020).Anti-viral activity of *Zingiberofficinale* (ginger) ingredients against the Chikungunya virus. *Virus Disease*, 31, 270–276. https://doi.org/10.1007/s13337-020-00584-0

Sunilson, J.A.J., Suraj, R., Rajitha, G., Anandarajagopal, K., Kumari, A.V.A.G. &Promwichit, P. (2009). *In vitro* antimicrobial evaluation of *Zingiberofficinale*, *Curcuma longa*, *Alpiniagalaga* extracts as natural food preservative. *American Journal of Food Technology*, 4, 192-200.

Uchejeso, O.M., Chinaza, I.R., Goodluck, O.A. & Rinpan, J.I. (2020). Some Igbo Indigenous Plants with Anti-COVID-19 Properties. In (Ed.), Alternative Medicine-Update. Intech Open. https://doi.org/10.5772/intechopen.94244.

Villena-Tejada, M., Vera-Ferchau, I.,Cardona-Rivero, A., Zamalloa-Cornejo, R., Quispe-Florez, M., Frisancho-Triveño, Z.,Abarca-Melendez, R.C., Alvarez-Sucari, S.G., Mejia, C.R., Jaime, A.&Yañez, J.A. (2021). Use of medicinal plants for COVID-19 prevention and respiratory symptom treatment during the pandemic in Cusco, Peru: A cross-sectional survey. *PLoS ONE*, 16(9),e0257165. https://doi.org/10.1371/journal.pone.0257165

Velavan, T.P. & Meyer, C.G. (2020). The COVID-19 epidemic. *Tropical Medicine and International Health*,25(3), 278–280.

WHO (2021). Weekly epidemiological update on COVID-19-3 August 2021. Available at https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---3-august-2021.

Wiersinga, W.J., Rhodes, A., Cheng, A.C., Peacock, S.J.& Prescott, H.C. (2020). Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19) - A Review. *The Journal of the American Medical Association* 324(8), 782-793.

Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., Lu, R., Niu, P., Zhan, F., Ma, X., Wang, D., Xu, W., Wu, G., Gao, G.F., Tan, W. & China Novel Coronavirus Investigating and Research Team (2020). A novel coronavirus from patients with pneumonia in China, 2019. The *New England Journal of Medicine* 382(8), 727-733. https://doi.org/10.1056/NEJMoa2001017.