



Ethno-medicinal potential of some plants for the treatment and management of COVID-19 in Kogi State

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Abstract

The focus of this study is to highlight potentials of some medicinal plants sources for the treatment and management of COVID-19 in Kogi State. A sample of 600 respondents from the three senatorial zones who have wealth of knowledge in plant use and traditional medicine was drawn using a stratified random sampling technique for the study. A well-organized questionnaire was the major source of instrument for data collection. Part of plants and their mode of application will also be sought. Recommendations will be given as to way forward that these plants will be used in the management and treatment of COVID-19.

Keywords: Corona virus; COVID-19; Ethnomedicine; Pandemic disease; SARS-CoV-2

1. Introduction

The Corona virus disease 2019 (COVID-19), caused by the corona virus is an infectious disease caused by the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) a group of large, single-stranded RNA viruses in an envelope is a virus that damages the respiratory tract of bats, camels, cattle, cats and other animals with its origin in Wuhan city, China and was first reported in December 2019. A few animal corona viruses evolve to infect humans, such as those that caused SARS, MERS, and COVID-19 outbreaks. The highly infectious virus quickly spread around the worldwide to become a global problem. The World Health Organization recognized this disease as a pandemic on 11 March 2020. Globally, millions of people have been infected by COVID-19 and many have died of this disease. Normal lives of people around the world are disrupted and the economic loss is incalculable, despite the highest scientific efforts and investments, effective ways to eradicate them is still lacking. Suspected and infected patients were placed in isolation, contact tracings were conducted, and detailed clinical and epidemiologic data were gathered. Similar to several other pandemics such as Ebola, meningitis, yellow fever, cholera, Lassa fever, measles, chicken pox, monkey pox among others that vaccines have been discovered for but they do not come cheap and are usually not readily available in recent decades, corona virus disease 2019 (COVID-19) or severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) emerged as a new disease, and currently there is no effective medicine to eliminate SARS-CoV-2. The first case of corona virus was confirmed in Nigeria on 27 February 2020, when an Italian man in Lagos tested positive for the virus, caused by SARS-CoV-2 (NCDC, 2020) On 9 March 2020, a second case of the virus was reported in Ewekoro, Ogun State. As a result of the contact Nigerian citizen had with the Italian man (P.M. News, 9 March 2020). The World Health Organisation (WHO, 2020), recognized this disease as a pandemic on 11 March 2020. The symptoms exhibited by patients affected includes fever, dry cough, shortness of breath, fatigue, muscle pain, headache, sore throat, diarrhea, vomiting, pneumonia, multiple organ failure, and eventually death. The COVID-19 pandemic deprives people of some of the very basic activities for living in a modern society, such as going to work, eating out with friends, and attending social gatherings. COVID-19 also serves as a wake-up call that reminds us how fragile our society still is when challenged by a pandemic, and much is to be learned about infectious diseases because we still lack effective ways to eradicate them. In addition, the economic impact of prolonged lock down on social issues such as loss of income and increased poverty,

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especially for the low and middle-income countries, is evident (Bonaccorsi *et al.*, 2020; United Nations Development Programme, 2020). Normal lives of people around the world are disrupted and the economic loss is incalculable, efforts put in place to control the spread include Social distancing use of face mask and hand hygiene which are considered the best way to reduce or delay a pandemic that is on course. The Centers for Disease Control and Prevention (CDC) described social distancing as a set of methods for reducing frequency and closeness of contact between people in order to decrease the risk of transmission of disease. W.H.O, 2020 explained further that in a situation whereby an infected person with corona virus coughs, yawns or sneezes, droplets carrying the virus are likely transmit to a very close person who may be at risk or the droplets contain virus are deposited on the surface of an objects where people may likely touch, thereby making the person to be at risk. Maintaining physical distance appropriately, not only reduce the tendency to contract the virus, but also mitigate the spread of the virus, (Nigerian Health Watch, 2020). Despite the highest scientific efforts and investments, effective ways to eradicate them is still lacking.

Plants have served as the main source of medicine for humans. The survival of man has been dependent on his innate curiosity to examine by trial and error all aspect of his environment (Saeed *et al.*, 2004). Plant medicines are the most widely used medicines in the world today for treating different types of diseases from ancient time this is because, plants have served as the main source of medicine for humans since the beginning of man. It appears from a significant number of recent studies that plant-based substances could also be potential candidates for developing effective and secure remedies against this novel disease. Some of the earliest modern medicines are indeed plant natural products for treating infectious diseases. Plants have a lot to offer for treating infectious diseases including COVID-19, but it will require interdisciplinary research efforts to fully realize this potential. With the disappearance of most floras, vast genetic bases of variation in botanical and zoological species that have evolved over thousands of years are being lost. WHO (2001) expressed that 80% of the world population or roughly two thirds of the world's population, rely almost exclusively on traditional medicines using natural substances mostly derived from plants in the treatment of diseases. In African countries, this rate is much higher. There is more to the plants than we see with our eyes. Everything in the universe is a language of life, an expression of life... if you want to know how beautiful the forests are, listen to their language. To be alive is to hear the echoes of life in the forest (Anslem, 2000). This statement shows how important the plant world is to humanity.

Medicinal plants are boosted with diverse secondary metabolites; some of them can interrupt viral protein and enzyme activities by binding with them, and prevent viral penetration, replication into the host cells (Li and Peng, 2013; Arbab *et al.*, 2017; Akram *et al.*, 2018; Dhama *et al.*, 2018). Numerous studies have been confirmed the bioactive natural compounds which could be potential candidates treating the novel SARS-CoV-2 due to their significant antiviral activity (Qamar *et al.*, 2020; Zhang *et al.*, 2020). The complicated secondary metabolism of plants has been the source of countless medicinal compounds and leads for drug discovery. It is little surprise then that plant products and their analogues have been employed as an early line of defense against COVID-19. This study thus, highlights potential medicinal plants sources for the treatment and management of COVID-19 in Nigeria.

Kogi State is located on latitudes 7° 30' N and longitude 6° 42' E and within the derived savanna zone of Nigeria (middle belt) and shares boundary with ten states. It has a total of 29,833km² (11,519sq mi) altitude of 420m above sea level and covers an area of approximately 10 kilometres square. The area is rich in savanna and forest vegetation and is home to a vast collection of plants upheld in folklore as having useful medicinal applications as well as other uses. The vegetation of the area is typical of the derived savanna. The major tribes inhabiting the area are Igala, Okun (Yoruba) and Ebira. Majority of the people are farmers. As at 2006 Census they have a population of about 3,314,043. The topography of this land is strongly undulating.

Presently many plants species are underutilized because of lack of information on the potentials and uses hence it is therefore imperative to carry out this study. Studies on the knowledge and use of natural resources by local populations may contribute to finding economic alternatives for these populations, especially in terms of the cultural uses of plants in relation to their application in the treatment and management of COVID-19. Kogi state is rich in savanna and forest vegetations having useful medicinal application as well as other uses. There is however scarcity of documented information on the various uses of plants, thus the need for this survey to generate a scheme of ethno-medicinal application in the treatment and management of COVID-19, with the hope of documenting such knowledge and preserving them for the future generation as more plants are lost. It is based on the foregoing that the researchers intend to highlight the potential of some medicinal plants sources for the treatment and management of COVID-19 in Kogi State and the information generated from this research will help supply the missing link.

The following research questions will be put forward:

- What are the species compositions of plants used for the treatment and management of COVID-19 in Kogi State?
- What are the mode of preparation and application of those plant species?

The study was essentially a survey research which sought to ascertain the potential of some medicinal plants sources for the treatment and management of COVID-19 in Kogi State. A sample of 1200 respondents from the three senatorial zones who have wealth of knowledge in plant use and traditional medicine would be drawn using a stratified random sampling technique for the study. Preliminary information would be obtained through the use of questionnaire and interviews with selected indigenous informants (ethno-botanists and herbalists or traditional medicine practitioners) to give information about the local (tribal or ethnic) names of the plants, as well as their location (ecological habitat) and distributions. The participants will be selected because of their knowledge of the use of medicinal plants. The data will be collected by the researchers using the prepared check-list, because vague information could implicate the study or even divert attention from the main focus of the study. The check-list for data collection will look into the plants in the area, names of plants (local or indigenous) and distribution of the plants, how the plants could be used to manage COVID-19.

2. Results

2.1. Sociodemographic characteristics of the respondents

A total of 600 respondents participated in the study, 55% of the participants were male while 45% were female, the median age was 41 years and 30% were ethnobotanists, 70% herbalists and traditional medicine practioners. 82% used medicinal plants to prevent fever and respiratory symptoms, and 63% used medicinal plants to treat fever and respiratory symptoms.

The harvest and use of different plant parts such as leaf, root, seed, flower, Rhizomes, bulb and corm were common and done in the study area for the preparation of herbal medicine. It was discovered that leaves were the most frequently used part of the medicinal plants 47% of the total, followed by root 17%, bark and stem 14% fruit and seed 6%, the whole plant, flower, rhizome, bulb and corm 3% and latex 1%.

The Table shows list of the species compositions of plants used for the treatment and management of symptoms similar to COVID -19 in Kogi State and their local names are clearly shown. The vegetation in Kogi State comprises of both the savanna and forest vegetation as such both savanna and forest species of plants are common features that could be seen in that area. Botanical name, common name, local names, part of plants used the initial uses and phytochemical contents of the acclaimed plants that could be used in the treatment and management of COVID-19 in Kogi State. The respondents reported the use of medicinal plants from a preselected list of symptoms related to that of COVID-19 symptoms.

Table 1 The plants that were identified for treatment and management of COVID 19 related symptoms

S/ No	Botanical name	Common name	Family	Local name	Parts used	Medicinal use	Phytochemical components
1	<i>Abrus precatorius</i> L	Crab Crab's eye, Saga-saga,	Fabaceae	Epu, Omejuichepka, Iwerejee, Ojuologbo	Leaves,	Cough, asthma, bronchitis, fever, cold, jaundice, scratches	Alkaloids, phenols, flavonoids, tannins, saponins, steroids, terpenoids, carotenoids,
2	<i>Abutilon indicum</i> L. (Sweet)	African mallow, Lantern flower	Malvaceae	Ambru, Furu	Leaves, flowers, bark, seed, roots	tuberculosis, cough, pains, jaundice, bronchial infection, diabetes	Alkaloids, glycosides, saponins, phenols, steroids,
3	<i>Acacia Nilotica</i> (L) Willd.ex Delile	Gum arabic Thorn mimosa	mimosaceae	Agweñeche, Ikeyi,	Leaves, flowers	venereal diseases, cough, sore throat, diarrhea, Diabetes, cancer, leprosy, pains, spleen and liver problems,	Alkaloid, Saponin, Tannins, Steroid, flavonoid, Terpenoid, Glycoside
4	<i>Acalypha indica</i> L	Copper leaf	Euphorbiaceae	Jiwene	Leaves, whole plant	Diabetes, fever, liver inflammation, asthma, bronchitis	Alkaloids, tannins, saponins, phenols, flavonoids, terpenoids,
5	<i>Acanthospermum hispidum</i> DC	Starbur Goat's head	Asteraceae	Asibowu, imiejo, dangurogogoro, Egun-igba,	Whole plant	Malaria, Typhoid, yellow fever, cough, headache, epilepsy, convulsion, migraine gonorrhoea, bronchitis, Tuberculosis, rheumatism,	Alkaloids, glycosides, flavonoids, saponins, tannins, phytosteroids
6	<i>Adansonia digitata</i> L	Baobab	Malvaceae	obobo, ose,usi	Leaves, fruits, bark, roots	malaria, asthma, fatigue, dysentery, diarrhoea,	flavonoids, phenols, tannins, steroids,
7	<i>Adenia cissampeloides</i> (Plach.Ex.Hook)Harms	Snake climber, Monkey rope	Passifloraceae	Arokeke, Dodo, Agodogbo	leaves, bark,root	Appetizer, general weakness, jaundice, diabetes, malaria, typhoid, veneral diseases, liver problem, bronchitis,	Alkaloids, glycosides, flavonoids, saponins, tannins, steroids,
8	<i>Adenia venenata</i> Forssk	Akebia	Passifloraceae	Arokeke, Dodo	leaves and bark	Malaria, jaundice,	Alkaloids, glycosides, flavonoids, saponins, terpenoids, phenols, tannins, steroids, carotenoids,
9	<i>Aframomum melegueta</i> K. Schum	grains of paradise, alligator pepper	Zingiberaceae	Ata, ose oji, ata-ire, Itaye,	seeds, leaves, root	Measles, small pox and typhoid fever	Alkaloids, phenols, glycosides, saponins, flavonoids, tannins,

							terpenoids, steroids, carotenoids,
10	<i>Ageratum conyzoides</i> L.	Goatweed	Asteraceae	Avihupahupa, Itanajuwe, Imiesu, Apasa, Pakudu,	Leaves, root	Malaria, spasms, colds, rheumatism, skin rashes, ulcers, diarrhea, gonorrhoea,	Alkaloids, flavonoids, terpenoids, steroids
11	<i>Alchornea cordifolia</i> (Schum & Thonn.) Muell. Arg.	Christmas bush	Euphorbiaceae	Oyi, Eginija, Ipa, Ifa, Esinyin,	Leaves	Malaria and Typhoid fever	flavonoids, terpenoids, tannins, glycosides, alkaloids, saponins
12	<i>Allium cepa</i>	Onion	Amaryllidaceae	Albasa, Alubasa, Alubosa, Albacha		Asthma, bronchitis, common cold, gastrointestinal disease	carbohydrates, flavonoids Alkaloids, phenols, glycosides, saponins
13	<i>Allium sativum</i> L.	Garlic	Amaryllidaceae	Ayuu, Ayo-ishi, Ayo		Cold and cough	saponins; glycosides; flavonoids Alkaloids,
14	<i>Aloe vera</i> (L.) Burm. f.	Aloe vera	Asphodelaceae	Alofera	Leaves	Oral infections, skin infections, ulcer, dysentery, diabetes, arthritis, diarrhea, piles, inflammation	Alkaloids, glycosides, flavonoids, saponins, terpenoids, phenols, tannins, steroids, carotenoids,
15	<i>Alstonia boonei</i> De Wild.	Stool wood, Pattern wood	Apocynaceae	Añõ, Awun, Ahun,	Root, leaves and bark	Malaria, ulcers, insomania, arthritis, sores, rheumatism, infertility, diarrhea Typhoid, gonorrhoea, asthma, dysentery	Alkaloids, glycosides, flavonoids, saponins, terpenoids, phenols, tannins, steroids, carotenoids,
16	<i>Anacardium occidentale</i> L.	Cashew	Anacardiaceae	Opigolo, Kaju, Ikashu,	Seeds, leaves and bark	Malaria and Typhoid fever, dysentery, snake bites, scurvy, elephantiasis, warts, hypertension, rashes, leprosy, ringworms, diabetes, diarrhea anthelmintics, sores	flavonoids, phenols, tannins,
17	<i>Ananas comosus</i> (L.) Merr.	Pineapple	Bromeliaceae	Ogèdè-oyibo, Opon-Oyibo,	Whole plant	Infectious diseases, fever, hypertension, asthma, bronchitis, Cancer, gonorrhoea, leprosy	Alkaloids, glycosides, tannins

18	<i>Andrographis paniculata</i> (Burm.f.) Nees	King of bitters , green chiretta	Acanthaceae	Ololo-ogeḽe, Mejemeje	Leaves, Aerial Parts	respiratory disease, common cold, cough, malaria fever, cancer, diabetes, high blood pressure, ulcer, leprocy, bronchitis, and skin diseases	Alkaloids, flavonoids, tannins, phenols, terpenoids,
19	<i>Annona senegalensis</i> Pers	Wild custard apple, African custard apple	annonaceae	Ukpokpo, Opa, Abo,	Leaves, root, bark	Cough, sore throat, asthma, bronchitis, eye problems, skin dieases, diarrhea, dysentery, Cancer, venereal diseases, toothache	Alkaloids, flavonoids, tannins, steroids, saponins,
20	<i>Anthocleista djalonensis</i> A. Chev.	Cabbage tree	Gentianaceae	Odogu, Oriweni, Sapoo	Barks	Purgative, Jundice, malaria, typhoid fever, pains, dysentery and snake bite	Alkaloids, glycosides, flavonoids, saponins, phenols, terpenoids, tannins,
21	<i>Anthonotha macrophylla</i> P.Beauv.		Fabaceae	Abara, Apado, Erinko, Aba, Akpalaa	Leaves, bark, roots	Appetizer, jaundice, malaria	Alkaloids, flavonoids, saponins, tannins,
22	<i>Aspilia africana</i> (pers) CD Adams	Marigold, Haemorrhage plant	Asteraceae	Idodolo, Yunyun,	Leaves, whole plant	Malaria and Typhoid fever, inflammation, cough, diabetes, diarrhea, wounds, tuberculosis, measles, osteoporosis, guinea-worm, nervous disorders, athlete's foot, night sweats, gonorrhea,	Alkaloids, glycosides, flavonoids, saponins, phenols, terpenoids, steroids, tannins, carotenoids, phytosteroids, carbohydrates
23	<i>Azadirachta indica</i> A. Juss	Neem	Meliacea	Dogonyaro, Oliodaa	Leaves , bark	Malaria and Typhoid fever, cold, ulcer	Alkaloids, flavonoids, saponins, tannins,
24	<i>Bambusa vulgaris</i> Schrad. Ex J.C. Wendl.	Bamboo	Poaceae	Ḙtachḙ, Oparun	Leaves	Malaria, indigestion, constipation, loss of appetite	Glycosides, Alkaloids, Phytosterols
25	<i>Biophytum petersianum</i> Klotzsch	African sensitive plant	Oxalidaceae	Patomo, Kpagadama	Whole plant	cerebral malaria and various kinds of pain	Flavinoids, Tannins, saponin
26	<i>Blighia sapida</i> K. D. Koenig.	Akee apple	Sapindaceae	Usin, Isin, Peso,lla, Oka, Okpu, Okpe,	Leaves, fruits, bark	Malaria, colds, typhoid, hernia, dysentery, epilepsy, skin diseases, gonorrhoea, cancer	Alkaloids, glycosides, flavonoids, saponins, terpenoids, phenols,
27	<i>Boehavia diffusa</i> Linn	Hog weed	Nyctaginaceae	Agolomalo, Etiponla, Olowojeja	Whole plant	Pain, jaundice, gonorrhoea, asthma, cough, cancer, Skin diseases, small pox,	Alkaloids, flavonoids, tannins,

28	<i>Bridelia ferruginea</i> Benth.	Bridelia	Phyllanthaceae	Ede, Oganga, Ira, Ira-odan, Ura	Leaves, bark, roots	Oral problem, Malaria, Typhoid fever, Stomach disorder	Alkaloids, saponins, steroids
29	<i>Bryophyllum pinnatum</i> (Lam.) Kurz.	Resurrection plant, life plant	Crassulaceae	Eru-odundun, abomoda	Leaves, roots and leaf sap	Cough, diarrhoea, dysentery, fever, sedatives, diuretic, abscesses, epilepsy, cancer.	Alkaloids, steroids, glycosides, tannins, flavonoids, saponins, terpenoids,
30	<i>Burkea africana</i> Hook.	Wild syringe	Caesalpinaceae	Okakachi, Orusi, Apasa,	Bark, twigs	Headache, jaundice, epilepsy, gonorrhoea, syphilis, diarrhea, stomach ache, hepatitis, poison, toothache	Alkaloids, glycosides, flavonoids, terpenoids, phenols, tannins, steroids,
31	<i>Caesalpinia bonduc</i> L.	Fever nut, Yellow nickers	Fabaceae	Shayo, Esho-ayo	Leaves, flowers root	Dysentery, malaria, typhoid fever, analgesic	flavonoids, terpenoids, steroids, carotenoids,
32	<i>Cajanus cajan</i> (L.) Millsp.	Pigeon pea	Fabaceae	Agwugwu, Sese-weere	Leaves, seeds	Malaria, Typhoid fever jaundice, measles, bedsores, diabetes, dysentery.	Alkaloids, flavonoids, saponins, tannins,
33	<i>Canna indica</i> L.	Canna lilly	Cannaceae Ulmaceae	Idodo, Oko okoko,	Leaves	Asthma, malaria	Alkaloids, tannins, glycosides,
34	<i>Cannabis sativa</i> L.	Marijuana, Indian hemp, Ganja	Cannaceae Ulmaceae	Igbo, Ako-tabá	Leaves, flower	Arthritis, constipation	Alkaloids, flavonoids, terpenoids
35	<i>Capsicum annum</i> L.	African pepper, Bell pepper,	Solanaceae	Akpọ, Ose, Ata	Leaves, Fruits	Malaria, heart disease, tooth ache	Alkaloids, carotenoids,
36	<i>Carica papaya</i> L.	Pawpaw	Caricaceae	Echipakpa, Asiren	Leaves, seeds, fruits	Malaria, Typhoid fever, pains, skin infection, and gonorrhoea	Alkaloids, tannins, glycosides, phenols, flavonoids, terpenoids,
37	<i>Cassia alata</i> L./ <i>Senna alata</i> (L.) Roxb.	Ringworm bush, Candle bush, Craw-craw plant	Fabaceae	Asowon, Asurun, Ogujeba	Leaves, flowers, seeds, roots	Fever, Asthma, skin infections, Brochitis, jaundice, diabetes, syphilis, tuberculosis, liver problems, Gonorrhoea, analgesic, heart failure, convulsion,	glycosides, flavonoids,
38	<i>Cassia obtusifolia</i> Linn/ <i>Senna tora</i> (L) Irwin & Barneby.	Sickle senna	Fabaceae	Idagbōfifi, Ako-rere, Epa-ikun,	Leaves	Malaria. leprosy, skin infections, liver disorder, ring worm,	Alkaloids, glycosides, flavonoids,

39	<i>Cassia occidentalis</i> L/ <i>senna occidentalis</i> (L.) Link.	Negro coffee, Coffee senna	Fabaceae (Leguminaceae)	Agbọ-ọmẹkpa, Akede-agbara, Rere, Papala-ọmọde	Leaves	Fever, Asthma, Brochitis, wounds, tuberculosis, Gonorrhoea, analgesic, liver problems, constipation, worms expeller	Alkaloids, flavonoids, tannins,
40	<i>Cassia sieberiana</i> DC	Drum stick, African labumun	Fabacea	Okpehieeka, Aridon-toro,	Leaves, bark, roots	Purgative, body pain, analgesic, antibiotic,	Glycosides, Steroids, Flavonoids, Tannins Alkaloids
41	<i>Ceiba pentandra</i> L. Gaertn	Kapok, White silk cotton tree	Malvaceae	Agwu, Araba, Eegun, Ponpola, Odere, Egungun	Leaves, bark, roots	stomach disorders, malaria, Typhoid fever, headache, diabetes, oedema, dizziness	Alkaloids, Flavonoids, Steroids, Saponins, Phenols, Tannins
42	<i>Celosia argenta</i> L.	Silver Cock's comb	Amaranthaceae	Iloolo, Abora, Osonyo-pupa, Sokoyokoto	Leaves, Tubers	Malaria, anemia, headache, inflammation in the eye, ulcer	Alkaloids, Flavonoids, Steroids, Saponins, Tannins, Terpenoids,
43	<i>Chochorus olitorus</i> L.	Jute mallow, West African sorrel	Malvaceae	Ibọlibọ, Ewedu, Ayoyo, Ọyọyọ, Ọrọ-itabiliko	Leaves, roots	Malaria, Typhoid fever and kidney diseases, gonorrhoea, cancers, Analgesics, piles, pains,	Glycosides, Steroids, Phenols, Terpenoids
44	<i>Chromolaena odorata</i> (L) R. King&H. Robinson	Siam weed	Asteraceae	Awo, Abilewa, Akintola,	Leaves	Malaria, sore throat, wound, dysentery, burns, headache, toothache, skin diseases.	Alkaloids, Flavonoids, Steroids, Terpenoids,
45	<i>Chrysophyllum albidum</i> G. Don	White star apple, Cherry	Sapotaceae	Èhia, Agbalumo, Baka, Osan-katampa	Leaves, bark, seeds	Malaria, Typhoid fever, yellow fever, diarrhea, skin eruption	glycosides, flavonoids, saponins, terpenoids, tannins, steroids,
46	<i>Citrus aurantifolia</i> (Christm.et Panz)	Lime	Rutaceae	Alemu-inale, Osan-wewe	Leaves, Fruits, roots	Malaria, typhoid fever jaundice	Alkaloids, Flavonoids, Tannins, Glycosides, Terpenoids, Phenols, Saponins, Essential Oil
47	<i>Citruslimon</i> (L.) Osbeck	Lemon	Rutaceae	Osan-laimu, Ilẹmọni	Leaves, fruits, roots	Malaria, Colds, cough, sore throat,	Essential Oil; Flavonoids; Phenols, Coumarins, Alkaloids, Glycosides, Terpenoids, Saponins, Tannins
48	<i>Citrus paradisi</i> Macfad.	Grapefruit	Rutaceae	Alemu-iba, Osan-paya,	Leaves, fruits, roots	Malaria and Typhoid fever	Alkaloids, Flavonoids, Essential Oil, Glycosides, Terpenoids, Phenols, Saponins, Tannins

49	<i>Clappertonia facifolia</i> (Willd.) Decne	Bolo-bolo	Malvaceae	Agborin-ilasa	Leaves, barks	Dysentery, malaria, typhoid fever	Alkaloids, terpenoids, steroids,	flavonoids, tannins,
50	<i>Cochlospermum tinctorium</i> Per.Ex. A.Rich.	False cotton plant	Bixaceae	Ichachafolo, Sewetu, Rawaye	Leaves	Malaria, liver problem	Alkaloids, Flavonoids, Terpenoids, Steroids	Glycosides, Saponins, Tannins,
51	<i>Combretum reticulata</i>	Velvet bush willow	combretaceae	Anragba	Leaves, Bark	Malaria, pains, sore throat, dysentery, bronchitis, yellow fever and jaundice, diarrhea, abdominal	flavonoids, steroids, phenols, carotenoids, coumarins,	saponins, terpenoids, tannins,
52	<i>Curcuma longa</i> L	Turmeric	Zingiberaceae	Atale-pupa,	Tubers, roots	Malaria, Typhoid fever	Alkaloids, Tannins, Steroids, Flavonoids,	Saponins, Phenols,
53	<i>Cymbopogon citratus</i> (DC.) Stapf	Lemon grass,	Poaceae	Egbe ihiolo, Koko – oba, Oko-oba, Koriko-oyibo,	Leaves	Malaria, cold, cough	flavonoids, terpenoids, steroids, coumarins,	saponins, tannins,
54	<i>Cyperus esculentus</i> Boeck.	Tiger nuts, yellow nut sedge	Cyperaceae	Èpa, Alubosa-igbo	Leaves, Root (Corm)	Analgesic, Indigestion, diarrhea, dysentery	Alkaloids, terpenoids, steroids,	saponins, phenols,
55	<i>Cyperus rotundus</i> L.	Black nut sedge, Ground almond	Cyperaceae	Èpa, Alubosa-igbo,	Leaves, Root (Corm)	Malaria fever, diabetes, bronchitis, leprosy	Alkaloids, phenols, tannins,	flavonoids,
56	<i>Dennettia tripetala</i> Baker f./ Uvariopsis tripetala (Baker f.) GE Schatz	Pepper fruit	Annonaceae	Opipi, Igberi, Ako, Akosa	Leaves, fruits, bark	Stimulant, cough, aid uterine contraction, convulsion, fever, toothache, inflammation	Alkaloids, flavonoids, terpenoids, steroids,	glycosides, saponins, tannins,
57	<i>Dialium guineense</i> Willd	Black tumble, Black tamarind, Velvet tamarind	Fabaceae	Aigele, Ahin, Awin,	Leaves, root	Cough, cold, fibroid	Alkaloids, saponins, phenols, steroids,	flavonoids, tannins,
58	<i>Dioscorea bulbifera</i> L.	Air potato, aerial yam	Dioscoreaceae	Okutaechi, Emina, Isi-ahun, Ipo, Ewura-esi,	Leaves, fruits	Sore throat, breast cancer, diabetes, cough, asthma, syphilis, piles, leprosy, dysentery, ulcer	glycosides, saponins, steroids,	flavonoids, phenols, tannins,

59	<i>Diospyros mespiliformis</i> Hochst.ex. A. DC	Monkey guava, African ebony, jackal berry	Ebenaceae	Kanran, Igi-dudu	Leaves, bark, roots	Malaria, headaches, Typhoid fever, bleeding, pneumonia, wounds, dysentery, leprosy	Alkaloids, Flavonoids, Saponins, Terpenoids, Tannins, Steroids,
60	<i>Emilia sonchifolia</i> (L.) DC ex Wright	Flora's paint, lilac tusselflower	Asteraceae	Odundun-odo	Leaves, whole plant	Malaria, asthma, pains, diarrhea, cancer, diabetes, cataract, liver problem	Alkaloids, Glycosides, Flavonoids, Saponins, Tannins, Terpenoids,
70	<i>Euphorbia heterophylla</i> Linn	Milk weed	Euphorbiaceae		Whole plant	typhoid fever; Skin diseases, purgative	Alkaloids, Flavonoids, Saponins, Tannins
71	<i>Euphorbia hirta</i> L.	Asthma weed	Euphorbiaceae	Enya-akpe, Omiakukede, Emi-ile, Ege-ile, Buje, Adindin, Irokoiju, irawoile, Orisa-ode,	Whole plant	Malaria, jaundice, skin diseases, gonorrhoea, diarrhea, dysentery, asthma, cough, catarrh, bronchitis, hypertension	Alkaloids, Glycosides, Flavonoids, Tannins, Steroids
72	<i>Ficus exasperata</i> Vahl.	Sand paper tree	Moraceae	Ijikpi, Epin, Ipin	Leaves	Malaria, Blood tonic, inflammation, pains, ulcer, hypotension, rheumatism	Flavonoids, Tannins, Saponins, Alkaloids
73	<i>Funtumia africana</i> (Benth.) Stapf.	Bush rubber	Apocynaceae	Ayon, Ako-ire	Leaves, roots stem,	Malaria, constipation, epilepsy, rheumatism, athsma, venereal diseases	Glycosides, Saponins, Terpenoids, Tannins, Steroids
74	<i>Garcinia kola</i> Heckel.	Bitter kola	Clusiaceae/ Guttiferae	Igoligo, Orogbo,	Leaves, Fruits, roots	Malaria, cough, asthma, infertility, venereal diseases	Alkaloids, Flavonoids, Saponins, Phenols, Tannins, Steroid, Terpenoid, Glycoside
75	<i>Gongronema latifolium</i> Benth.	Swallow apple	Apocynaceae	Arokeke, Aunje-adiye, Iteji	Leaves, barks	Malaria, Typhoid fever, catarrh, congested chest, running nose, cough, dysentery, intestinal worm	Alkaloids, Saponins, Tannins, Flavonoids, Glycosides, Terpenoids, Steroids
76	<i>Gossypium hirsutum</i> Linn.	Cotton wool	Malvaceae	Owu-etutu, Owu, Owututu,	Leaves, roots	Malaria, constipation, convulsion, dysentery, diarrhea, headache	Alkaloids, Glycosides, Tannins, Flavonoids, Saponins, Steroids, Phenols
77	<i>Haematostaphis barteri</i> Hook.f.	Blood plum	Anacardiaceae	Ekudan, Aridantooro	leaves, barks	Malaria, Typhoid fever, Analgesic	Glycosides, Flavonoids, Tannins, Phenols,

78	<i>Heliotropicum indicum</i> Linn	Indian Heliotrope	Boraginaceae	Ogba-Aiko, Apari-Igun, Akariko	Leaves	Malaria, Typhoid, Convulsions, cancer, worms, rectal enema, mouth-wash	Glycosides, Saponins, Tannins, Steroids,
79	<i>Hibiscus sabdariffa</i> L.	Red Sorrel	Malvaceae	Isapa-pupa, Agolo-kpikpa	Leaves, flowers	Malaria, dysentery, hypertension, liver problem	Alkaloids, Flavonoids, Saponins, Steroids,
80	<i>Hyptis suaveolens</i> Poit.	Bush Mint	Labiatae	Egbe-imu, Jogbo, Arunfofo	Leaves, roots	Malaria, Cough, ulcer, stomach problems, diabetes, eczema, cancer, headache	Alkaloids, Flavonoids, Saponins, Terpenoids, Phenols, Tannins, Steroids,
81	<i>Khaya senegalensis</i> A. Chev	Savanna mahogany	Meliaceae	Ago, Oganwo,	Barks, roots	Typhoid fever, cough, tuberculosis	Alkaloids, Flavonoids, Terpenoids, Tannins, Glycosides, Saponins, Phenols,
82	<i>Lophira alata</i> BankF. Gaertn.	Iron woodShrubby oak, False shea	Ochnaceae	Okopi, Akufo, Okopia, Iponhan, Ekki, Eleba,	Leaves, barks, seed, roots	Malaria, Typhoid fever, jaundice	Alkaloids, Glycosides, Flavonoids, Saponins, Phenols, Tannins, Steroids,
83	<i>Lycopodium cernuum</i> L./L. <i>carinatum</i> Desv.	Keeled tassel fern, Arching clubmoss	Lycopodiaceae	Kujekuje,	Leaves	Malaria, jaundice in New born baby, lung problems, bronchitis, kidney disorder, gastric inflammation constipation,	Alkaloids, Terpenoids, Phenols,
84	<i>Mangifera indica</i> L	Mango	Anacardaceae	Umagolo, Imango,	leaves, barks	Asthma, bronchitis, Malaria, Typhoid fever, jaundice diarrhoea, diabetes, insomnia, insanity, cough	Carotenoids, Phenols, Steroids, Flavonoids, Terpenoids,
85	<i>Mentha arvensis</i> L.	Mint	Lamiaceae/Labiatae	Achefa, Achafa, Efinrin-aaja	Leaves	Fever, tooth decay, stomach disorder, asthma, jaundice, indigestion, spleen problem, rheumatism	Alkaloids, Glycosides, Flavonoids, Saponins, Tannins, Steroids
86	<i>Mitragyna inermis</i> (Willd.) Kuntze	African linden	Rubiaceae	Igbade-okobo, Abura,	Leaves	Malaria, cholera, headache, diarrhea, dysentery, epilepsy, mental problem, hyperesion, intestinal worms	Alkaloids, Flavonoids, Steroids, Terpenoids, Phenols,
87	<i>Momordica charantia</i> L	African cucumber/ Balsam pear,	Cucurbitaceae	Iliahia, Ejirin-wewe, Igbole-aja, Akiara-aje	Leaves, fruits	Malaria, gonorrhoea, jaundice, liver problems, ulcers, measles, chicken pox, diabetes, burns, leprosy, cough, asthma, hypertension	Alkaloids; Carotenoids; Saponins; Steroids, Flavonoids,

88	<i>Monadora myristica</i> (Gaertn.) Dunal	African nutmeg	Annonaceae	Ukwa, Ila-osin, Abo-ikose,	Leaves, Seeds	Malaria, typhoid fever, stomach ache, eye infection	Glycosides, Saponins, Tannins, Steroids,	Flavonoids, Terpenoids,
89	<i>Morinda lucida</i> Benth.	Hog apple	Rubiaceae	Oguro, Ogele, Oruwo, Erewo, Owuru, Origbo,	Leaves	Malaria, jaundice, gonorrhoea, leprosy, piles, ulcer, dysentery	Alkaloids, Flavonoids, Tannins, Terpenoids,	Glycosides, Phenols, Steroids,
90	<i>Musa paradisiaca</i> L.	Plantain	Musaceae	Agbo, Ogede-agbagba, ogede-apanta, ogede-lila,	fruits, flower	Malaria, Typhoid fever, leprosy, cancer, diarrhea, dysentery, epilepsy, hypertension, diabetes, bleeding	Saponins, Tannins, Phenols,	Alkaloids, Flavonoids,
91	<i>Musa sapientum</i> L.	Banana	Musaceae	Ogele, ogede-wewe,	fruits, flowers	Malaria, Typhoid fever, epilepsy, diarrhea, dysentery, cancer, hypertension, diabetes, leprosy, bleeding	Alkaloids, Carbohydrates, Glycosides.	Flavonoids,
92	<i>Napoleona imperialis</i> P. Beauv.	Napoleon's hat	Lecythidaceae	Akpako, Gbogbori, Boribori, Otokuchi, Obu-anagbo, Oligodogodo	Leaves, barks, roots	Malaria, Yellow fever, diabetes	Saponins, Terpenoids, Steroids,	Glycosides,
93	<i>Nauclea latifolia</i> Sm	African peach	Rubiaceae	Ogbai, Ogbase, Ogbesin, Gberesi	Leaves	Typhoid fever, skin infection	Alkaloids, Flavonoids, Terpenoids, Tannins,	Glycosides, Saponins, Phenols,
94	<i>Nicotiana tabacum</i> L.	Tobacco	Solanaceae	Ataba, Utaba, Taba	Leaves	Malaria, Yellow fever, diabetes, hypertension, wound	Alkaloids, Flavonoids, Terpenoids, Steroids,	Glycosides, Saponins, Phenols,
95	<i>Nymphaea lotus</i> L.	White lotus, white water lily	Nymphaeaceae	Oshipata,	whole plant	Malaria, vomiting	Flavonoids, Phenols	
96	<i>Ocimum basilicum</i> Linn.	Basil, Sweet and hairy basil, Tea bush	Lamiaceae/Labiatae	Anyeba-egini, Efirin-wewe,	Leaves	Malaria, stomach disorders, asthma, bronchitis	Glycosides, Saponins, Phenols, Tannins, Steroids,	Flavonoids, Terpenoids,
97	<i>Ocimum gratissimum</i> Linn.	African sent leave, scent leaf,	Lamiaceae	Anyeba, Efirin-nla, Efirin-ajase, Efirin-oso,	Leaves	Malaria, stomach disorders, asthma, bronchitis	Phenols; Terpenoids, Glycosides, Tannins,	Flavonoids, Alkaloids, Saponins,

98	<i>Parkia biglobosa</i> (Jacq.) R.Br.ex.Don	West African Locust bean tree	Fabaceae	Ugba, Iru, Iyere, Igba, Abata,	Leaves, barks, seed, roots	Typhoid fever blood tonic, diabetes	Alkaloids, Flavonoids, Phenols, Tannins
99	<i>Parquetina nigrescens</i> (Afzel.) Bullock.	African parqetina, Periploca	Apocynaceae	Ukpakele-edo, Ogbo-ewidun, Elepe, Inuwu	Leaves, barks	Malaria, Blood tonic, cough	Glycosides, Saponins, Phenols, Tannins
100	<i>Pentaclethra macrophylla</i> Benth.	African oil bean	Fabaceae	Igbogbo, Akpala, Aparara, Apaha, Apawa, Apapa, Pala,	Leaves, barks, latex	Typhoid fever, cough, gonorrhoea	Alkaloids, Flavonoids, Saponins, Phenols, Steroids, Carotenoids
101	<i>Phyllanthus nururi</i> L./ <i>P. amarus</i>	Stonebreaker	Phyllanthaceae	Ogwumejogba, Ashansha	Leaves	Fever, Skin infection, hepatitis, asthma, Gonorrhoea, genito-urinary diseases, diabetes, typhoid, jaundice, stomach-ache, dysentery, ringworm, kidney stones, hypertension, liver disorders,	Alkaloids, Flavonoids, Saponins, Phenols, Steroids, Carotenoids
102	<i>Physalis angulata</i> L.	Ground cherry, Wild gooseberry,	Solanaceae	Lababuje, Ikpakpo, Ikpakpele, Ukpakpele,	Leaves	Malaria, asthma, skin problems, rheumatism, tooth ache, liver problem, gonorrhoea, indigestion	Alkaloids, Glycosides, Flavonoids, Saponins, Phenols, Steroids, Tannins, Terpenoids
103	<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh.	Monkey bread	Fabaceae	Marupa, Marupatesu, Omukpakpa	Leaves	Malaria, cough, sore throat, bronchitis, diarrhea, leprosy, ulcer, tooth ache, rheumatism, heart problem, wound	Alkaloids, Glycosides, Steroids, Flavonoids, Terpenoids,
104	<i>Piper guineense</i> Schumach	West African Black pepper	Piperaceae	Aiyimili, Iyere, Ataiyere	Leaves, seeds	Malaria, Typhoid fever, cough	Terpenoids, Alkaloids, Flavonoids,
105	<i>Piper longum</i> L	Long pepper	Piperaceae	Akpoko, Ata	Root, leaves, fruits	Bronchitis, asthma, gonorrhoea, cough, malaria, stomach ache, cold, poison (snake bite or scorpion sting)	Alkaloids, saponins, carbohydrates
106	<i>Piperomia pellucida</i>	Pepper elder, Shiny bush	Piperaceae	Rinrin, Renren, Nini		Asthma, bronchitis, Abdominal pain, fatigue, headache, boil, joint pain, fever, wounds	Terpenoids, Alkaloids, Steroids, Flavonoid, Phenols, Saponins, Tannins, Carotenoids
107	<i>Rauvolfia vomitoria</i> Afzel.	African serpent wood, African snake root	Apocynaceae	Okata, Dodo, Asofeyeje, Ira-igbo,	Leaves, roots	Constipation, Typhoid fever, mental illness, hypertension, hernia and skin rashes	Alkaloids, Flavonoids, Tannins, Steroids, Saponins,

							Terpenoids, Anthraquinones,
108	<i>Senna podocarpa</i> (Guill & Perr.) Lock.		Caesalpiniaceae	Asunwon	Leaves, stem, roots	Malaria, Wounds, Skin Infections, Diabetes, arthritis, rheumatism, cholera, stomach disorder, gonorrhoea,, worms	Alkaloids, flavonoids, saponins, tannins,
109	<i>Spondias mombin</i> Linn	Hog plum	Anacardiaceae	Ochikala, Echikala, Iyeye,	Leaves, fruits	Malaria, cough, asthma, bronchitis, diarrhoea, dysentery, gonorrhoea, cold, stomach ache, worm expeller, sore throat, catarrhar, diabetes, measles, toothache	Alkaloids, Flavonoids, Steroids, Saponins, Phenols, Tannins, Glycosides
110	<i>Syzygium aromaticum</i> (L) Merr.& L.M. Perry	Clove	Myrtaceae	Kanampari, Isinren Kanafuru,	fruits	Malaria sore throat, sore throat,	Terpenoids, Phenols, Tannins, Flavonoids,
111	<i>Syzygium cumini</i> (L.) Skeels/ <i>Eugenia jambolana</i> Lam	Malabar, black plum, java plum,	Myrtaceae	Maimoo, Ori-ira	Leaves, roots, seeds, flowers	Asthma, bronchitis, sore throat, ulcers, dysentery,	flavonoids, terpenoids, tannins, steroids,
112	<i>Tridax procumbens</i> Linn	PWD Weed	Asteraceae	Avi-adeji, Abojigbinigbini, Eekule, Igbalode	Whole plant	Fever, hypertension, convulsion, stomach ache, ulcer, backache	Alkaloids, Tannins, Glycosides, Flavonoids, Saponins, Terpenoids,
113	<i>Vernonia amygdalina</i> Dcl.	Bitter leaves	Asteraceae	Ilo, Ewuro	Leaves, stem	Malaria, Typhoid fever	Alkaloids, Glycosides, Flavonoids, Saponins, Phenols, Tannins, Steroids, Anthraquinones
114	<i>Xylopia aethiopica</i> (Dunal) A. Rich	Negro pepper	Annonaceae	Èḗru, Èrunje, Alu,	Leaves, bark Fruits, Seeds	Stimulant, diabetes, Malaria, analgesic, cancer, bronchitis, dysentery, cough, asthma, rheumatism	Terpenoids, Alkaloids, Saponins, Glycosides, Tannins, Flavonoids, Steroids, Anthraquinones, Carotenoids
115	<i>Zingiber officinale</i> <i>Roscoe</i>	Ginger	Zingiberaceae	Jinja, Ata-ile	Rhizome	Malaria, Typhoid fever, Cough, asthma, bronchitis,	Alkaloids, Terpenoids, Phenols, Tannins, Steroids, Flavonoids

3. Discussion

During this study, a total of 115 medicinal plant species belonging to 45 botanical families was identified as having potentials to treat and manage COVID-19 based on the symptoms. Fabacea 12, Asteraceae, Malvaceae 7, Apocynaceae, Solanaceae 5, Anacardaceae Annonaceae, Euphorbiaceae, Lamiaceae, Meliaceae, 4, Solanaceae, Zingiberaceae 3, Amaryllidaceae, Caesalpinaceae, Cannaceae/Ulmaceae, Cyperaceae, Musaceae, Myrtaceae, Passifloraceae, Phyllanthaceae, Poaceae, 2, Acanthaceae, Amaranthaceae, Asphodelaceae, Bixaceae, Boraginaceae, Bromeliaceae, Labiatae, Caricaceae, Clusiaceae, Combretaceae, Crassulaceae, Cucurbitaceae, Dioscoreaceae, Ebenaceae, Gentianaceae, Lecythidaceae, Lycopodiaceae, Moraceae, mimosaceae, Nyctaginaceae, Nymphaceae, Ochnaceae, Oxalidaceae, Sapotaceae, Sapindaceae 1 were in use by the different categories of practitioners. The table indicated Botanical names, English/common names, family, local/vernacular names, parts of plants and uses of the various medicinal plants and the phyto-chemical compositions of plants. These plants are rich in bioactive substances. The majority of these compounds are well known for their positive biological effect on the diseases they are acclaimed to treat.

The importance of local names of plants are very essential in the ethnobotanical study of plants in various communities, tribe or culture this is because plants are more easily recognized by local people by their local names in every part of the world, although local names are not recommended directly for scientific accounts of plants as they lack uniformity and consistency, yet they are certainly seen as a useful tool for obtaining useful information on plants (Singh, 2008). Respondents gave local names of plants for treating common ailments and symptoms that are related to COVID 19 symptoms. The local names mentioned were authenticated with their respective botanical names using standard texts. Local names provide means of reference by local people in a particular area. Information gathered showed that increasing number of people is turning to herbal remedies for prevention and cure of various diseases. It was discovered that people in rural communities use plants without any scientific base as there is gap between traditional use of plants and the knowledge of the phytochemical constituents of plants, it is only very limited number of phytochemical studies that have been documented. It is therefore important to obtain the important knowledge from traditional local folklore in relation to medicinal use of plants and then carryout the phytochemical analysis to help give insight on the useful theurapeutic compounds of medicinal plants for the isolation of novel compounds as well as for their protection, usefulness and effectiveness of this disease.

It was observed that all the medicinal plants were used for 2 or more symptoms and also more than one plant can be used to treat and manage a particular symptom. The medicinal plants identified were represented by all plant forms which are Trees, shrubs, herbs, climbers, creepers and grasses. Trees were found to be the most used plants followed by herbs, shrubs, climber, underground stem, creeper and grass. It was also noted most of the plants have little or no side effects; this was in accordance with Gbile and Adesina (1986). In agreement with Adekunle (2008) and Ayodele (2005) plant leaves is seen as a major component in most herbal preparation as such are important ingredient in traditional treatment of various diseases. Most of the herbal preparations were obtained from combinations with other plants, only few were prepared using more than one method. Decoctions and infusions were the most frequently used methods. The result of this survey showed that majorities (87%) of the respondents are of the opinion that there is little or no occurrence of side effects when herbal preparations are used by people. Some of the plants revealed in the survey have been cited in the ethnobotanical survey of some African countries (Oni, 2010; Erinoso and Aworinde, 2012; Anslem, 2000; Adhikari, Marasini and Rayamajhee, 2020; Attah *et al.*, 2021).

4. Conclusion

The numerous plant species documented for the prevention and treatment of COVID-19 is a major indication of the potential that exists locally. It was discovered that in Nigeria medicinal plants are significantly used for both prevention and treatment of fever, respiratory diseases and other diseases that have similar symptoms with COVID-19. It was also observed from the study that there are so many important medicinal plants with antiviral activity which can be used for viral infections or can be prescribed as supportive treatment, lack of information on the safety profile and amount of dose for different diseases is some of the limitations of medicinal plants this is in line with Demeke *et al.*, (2021) report. It is hoped that the documented potentials of plants in Nigeria in the treatment and management of COVID-19 would assist plant lovers and the young generation understand the application of these plants in their immediate environment and explore options for ways to improve their conservation and reduce the destruction of plants that are of immense benefit to humanity. Some of these plant species have reasonable commercial significance.

The use of herbal medicine and its phytochemical bioactive components are of potential benefit in preventing and managing COVID-19. This is because the phytochemical components of different valuable plants used as herbal medicine can interfere with COVID-19 pathogens by inhibiting SARS-CoV-2 replication and entry to its host cells. Plants

biochemicals are very good herbal drink or fruit that can be introduced as effective adjuvant components in COVID-19 management; and also, to reduce fever, cough and others as the most common complication of COVID-19 symptoms.

Recommendations

The following recommendations are suggested:

- Developing and incorporating ethnobotanical knowledge curriculum in our secondary and tertiary educational institutions that will lead to awareness of the importance of plants in the immediate environment of the populace as well as improving their interest in traditional medicine.
- Creating awareness for the documentation of valuable plants in the environments that are of ecological, economical and medicinal value and also documenting the ethnobotanical knowledge of native plants
- Proper trainings, workshops, exposure visits and publications should be organized on ways of producing, using, preparing and persevering plants in their environment.
- The government should support research and develop activities that will help evaluate and standardise traditional or herbal medicinal practice as this will promote plants' safe, effective and affordable use.
- There is need to encourage private and government partnership for ethnomedicine or traditional medicine as this will improve the use of plants without damaging or misusing plants, it will also improve the production and the conservation of plants potential.
- Providing educational material in native languages to update collectors about occurrence of medicinal plants, their healing significance, and market values. Commercial exploitation of medicinal plants should make sure to safeguard the intellectual property rights of local people.
- Production of drugs that is very effective in treating viral diseases and drugs that can be used in combination with other drugs from plants to improve the therapy of coronavirus-infected subjects without negative side effects.

Compliance with ethical standards

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Disclosure of conflict of interest

The researcher declares that there is no conflict of interest with any business organization concerning the study.

References

- [1] Adekunle, M. F. (2008). Indigenous uses of plants leaves to treat malaria fever at Omo Forest Reserve (OFR), Ogun State, Nigeria. *Ethiopia Journal of Environmental Studies Management*, 1(1), 31- 35.
- [2] Adhikari, B.; Marasini, B. P. and Rayamajhee, B. (2020). Potential roles of medicinal plants for the treatment of viral diseases focusing on COVID-19: A review. *Phytotherapy Research*. 2020, 1–15.
- [3] Akram, M.; Tahir, I.M.; Shah, S.M.A.; Mahmood, Z.; Altaf, A.; Ahmad, K.; Munir, N.; Daniyal, M.; Nasir, S. and Mehboob, H. (2018). Antiviral potential of medicinal plants against HIV, HSV, influenza, hepatitis, and coxsackievirus: a systematic review. *Phytotherapist Research*. 32(5), 811–822.
- [4] Anslem, A.O. (2000). *Nature power: A Christian approach to herbal medicine*. Don Bosco training centre, Ewu-Esan Edo State

- [5] Arbab A. H.; Parvez M. K.; Al-Dosari M. S. and Al-Rehaily A. J. (2017). In vitro evaluation of novel antiviral activities of 60 medicinal plants extracts against hepatitis B virus. *Experimental and Therapeutic Medicine* 14 (1), 626 – 634.
- [6] Attah, A. F.; Fagbemi, A. A.; Olubiyi, O.; Dada-Adegbola, H.; Oluwadotun, A.; Elujoba, A. and Babalola, C. P. (2021). Therapeutic potentials of antiviral plants used in traditional african medicine with COVID-19 in focus: A Nigerian perspective. *Frontier Pharmacology* 12, 596 – 855.
- [7] Ayodele, A. E. (2005). The medicinally important leafy vegetables of South-Western Nigeria. (<http://www.siu.edu/ebl/leaflets/ayodele/html>).
- [8] Bonaccorsi, G.; Pierri, F.; Cinelli, M.; Flori, A.; Galeazzi, A. and Porcelli, F. (2020). Economic and social consequences of human mobility restrictions under COVID-19. *Proceedings of the National Academy of Sciences*. 117 (27), 15530–15535.
- [9] CDC . (2020). Coronavirus disease 2019 (COVID-19) and you. Retrieved from www.cdc.gov 10/05/2021
- [10] Darrell, P. (1990). *Plants and Culture: Ethnobotany and Education*. Royal Botanic Garden, 20A Inverleith Row, Edinburgh EH3 5LR, Scotland
- [11] Demeke C. A.; Woldeyohanins A. E. and Kifle Z. D. (2021). Herbal medicine use for the management of COVID-19: A review article. *Metabolism Open* 12 100141.
- [12] Dhama, K.; Karthik, K.; Khandia, R.; Munjal, A.; Tiwari, R. et al. (2018). Medicinal and therapeutic potential of herbs and plant metabolites/extracts countering viral pathogens-current knowledge and future prospects. *Current Drug Metabolism* 19 (3), 236-263.
- [13] Erinoso, S. M. and Aworinde, D. O. (2012). Ethnobotanical survey of some medicinal plants used in traditional health care in Abeokuta areas of Ogun State, Nigeria. *African Journal of Pharmacy and Pharmacology*. 6(18), 1352-1362.
- [14] Gbile ZO, Adesina SK (1986). Nigerian flora and its pharmaceutical potentials. *Journal of Ethnopharmacology*, 19: 1-16.
- [15] Li T. and Peng T. (2013). Traditional Chinese herbal medicine as a source of molecules with antiviral activity. *Antiviral Research* 97 (1), 1-9.
- [16] Nigeria Centre for Disease Control, (2020). First Case of Corona Virus Disease Confirmed In Nigeria. 28 February 2020. Retrieved 10 March 2020.
- [17] Nigerian Health Watch (2020). Coronavirus: time to take social distancing seriously in Nigeria. Accessed March 26, 2020.
- [18] Oni P. I. (2010). Ethnobotanical survey of a fallow plot for medicinal plants diversity in Idena village, Ijebu-Ode, South-Western Nigeria. *Journal of Medicinal Plant Research*, 4(7), 509-516.
- [19] P.M. News. 9 March 2020. Nigeria records second case of Coronavirus. Retrieved 10 March 2020.
- [20] Plotkin, M. J. (1995). The importance of ethnobotany for tropical forest conservation. *Ethnobotany: Evolution of a Discipline*. Oracle, AZ, Dioscorides Press.
- [21] Qamar U. I.; Alqahtani M. T.; Alamri S. M.; Mubarak A. and Chen L. L. (2020). Structural basis of SARS-CoV-2 3CLpro and anti-COVID-19 drug discovery from medicinal plants. *Journal of Pharmaceutical Analysis* 2020
- [22] Singh H (2008). Importance of local names of some useful plants in ethnobotanical study, Indian. *Journal of Traditional Knowledge*. 7(2): 365-370
- [23] United Nations Development Programme. (2020). Addressing the COVID-19 economic crisis in Asia through social protection, United States of America.
- [24] World Health Organisation (2020). Expert panel endorses protocol for COVID-19 herbal medicine clinical trials. Available at: <https://www.afro.who.int/news/expert-panel-endorses-protocol-COVID-19-herbal-medicine-clinical-trials> (Accessed Sep 23, 2020).
- [25] World Health Organization (2020). Naming the coronavirus disease (COVID-19) and the virus that causes it. [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(COVID-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(COVID-2019)-and-the-virus-that-causes-it). Accessed 10 May 2020.
- [26] Zhang Q, Wang Y, Qi C, Shen L, Li J (2020). Clinical trial analysis of 2019-nCoV therapy registered in China. *Journal of Medical Virology* 92 (6), 540 – 545.