Potential of Malawi’s medicinal plants in Covid-19 disease management: A review

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Abstract

The Coronavirus Disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has triggered an international pandemic that has led to significant public health problems. To date, limited evidence exists to suggest that drugs are effective against the disease. As possible treatments are being investigated, herbal medicines have shown potential for producing novel antiviral agents for the COVID-19 disease.

Aim

This review explored the potential of Malawi's traditional medicinal plants for the management of COVID-19.

Methods

The authors searched on PubMed and Google scholar for medicinal plants that are used in Malawi and published in openly available peer reviewed journals. Plants linked with antiviral treatment, anti-COVID-19 activity or COVID-19 symptoms management were targeted. These included activity against pneumonia, inflammation, cough, difficulty in breathing, pain/aches, fever, diarrhoea, rheumatism, fatigue, asthma, immunocompromised and cardiovascular diseases.

Results

11 studies were found with 306 plant species. 127 plant species had at least one COVID-19 related pharmacological activity. Of these plant species, the number of herbal entities used for each indication was: pain/aches (87), fever (2), pneumonia (9), breathing/asthma problems (5), coughing (11), diarrhoea (1), immunosuppression (8), blood issues (10), fatigue (2), heart problems (11), inflammation (8), rheumatism (10) and viral diseases (12). Thirty (30) species were used for more than one disease and Azadirachta indica topped the list (6 of the 13 COVID-19 related diseases). The majority of the species had phytochemicals known to have antiviral activity or mechanisms of actions linked to COVID-19 and consequent diseases’ treatment pathways.

Conclusion

Medicinal plants are a promising source of compounds that can be used for drug development of COVID-19 related diseases. This review highlights potential targets for the World Health Organization and other research entities to explore in order to assist in controlling the pandemic.

Key Words: traditional medicine, herbal products, corona virus, drug development, screening

Introduction

Viruses are pathogens that cause communicable diseases like flu, AIDS and Ebola and increasing evidence shows that some viruses play a role in the disease mechanism of some non-communicable diseases like cancers, Alzheimer's disease and type 1 diabetes with high morbidity and mortality rates worldwide.1 Most of these diseases have proved hard to cure.2-5 Viruses cause epidemics that emerge and re-emerge and are easily transmitted to different locations due to increased global travel and rapid urbanization. Emergence of novel viruses and rapid mutation of old viruses make drug as well as vaccine development challenging and these are some of the major reasons why there has not been significant development of effective drugs or vaccines against many viruses. Notable viruses that have caused outbreaks with significant public health implications worldwide include dengue virus, influenza virus, measles virus, severe acute respiratory syndrome (SARS) virus, and West Nile virus and the recently discovered severe acute respiratory syndrome corona virus 2 (SARS-CoV-2).6,7 The SARS-CoV-2 is a novel virus that was discovered in 2019 in Wuhan City of Hubei Province in China and has spread rapidly throughout the world, causing serious health care burden. The virus causes a disease called COVID-19 disease that affects all populations of people, but the elderly and those with underlying medical conditions are at a higher risk of morbidity and mortality.8-10 Being a novel disease caused by a novel virus, knowledge about the virus and the disease is limited and keeps on developing daily.11 SARS-CoV-2 is a 60 nm to 140 nm diameter, enveloped, positive sense RNA virus (11) belonging to the Coronavirus (CoVs) that are generally enveloped viruses with single-stranded RNA genome. CoVs have the largest genomes to date among RNA viruses that range from approximately 26 to 32 kilobases. They replicate by genes encoding for viral structural proteins such as nucleocapsids (N), membranes (M), spikes (S), and envelopes (E), which play significant roles in viral integrity.12 However, there are other commonly studied proteins that have been widely targeted
Traditional medicines, especially Chinese herbs, have been tested for use in COVID-19. Aanouz et al., (2020) used computational techniques to evaluate the inhibition potential of compounds isolated from plants used in Morocco against COVID-19 virus. Sixty seven (67) compounds isolated from aromatic and medicinal plants were found and selected for molecular docking studies that used energy of interaction between the compound’s functional groups and the coronavirus (SARS-COV-2 spike protein) as one of the criteria for anti-corona virus effect. Chloroquine was used as a standard (interaction energy of −6 kcal/mol). Eleven (11) molecules showed a good interaction with the target, but the three greatest activities were for Crocin from C. sativus L. (-8.2 kcal/mol), Digitoxigenin (Nerium oleander L., -7.2 kcal/mol) and β -Eudesmol (Laurus nobilis L., -7.1 kcal/mol). Experimental data also showed that they had antiviral activity. For example, Crocin was found in vitro to be an inhibitor of the replication of Herpes Simplex Virus (HSV) before and after virion entry in Vero cells, and its plant/herbal medicine source showed promise for use as an anti-HSV and anti-Human Immunodeficiency Virus (HIV) agent. Derivatives of Digitoxigenin are used as antiviral and anticancer inhibitors, while β -Eudesmol has substantial antibacterial and antiviral activity.

Zhang et al., (2020) executed a rational computer-based screening study aimed at identifying Chinese medical herbs and compounds with antiviral activity against respiratory infections and COVID-19. This computer-based study searched through literature for natural compounds and their respective traditional Chinese medicinal plants known to fight against MERS or SARS coronavirus. Docking studies were completed to analyse their potential for direct interaction with SARS-COV-2 protein, followed by biological activity search from literature. Thirteen (13) out of the 115 compounds found in the search of traditional Chinese medicines exhibited potential for anti-COVID-19 activity and 125 screened Chinese herbs contained 2 or more of the 13 compounds. A search for pharmacological activity showed that 26 of the 125 herbs had antiviral activity in respiratory infection, and that they regulated viral infection, immune/inflammation reactions and response to hypoxia. Hui et al., (2020) evaluated studies that tested the use of Chinese medicine (CM) as prophylaxis on people exposed to SARS and H1N1 influenza in clinical trials, cohort or other population studies. Results showed that the Chinese medicines performed well as prophylaxis, an effectiveness that has also been recorded in historical practice with CM. During the COVID-19 epidemic, several CM products were also tested in humans for prevention of the epidemic effects and selection of the CM was based on historical use and previous experimental results in similar viral epidemics. The CM used in the studies included radix astragali (Astragalus propinquus Schischkin), radix glycyrrhizae (Glycyrrhiza uralensis Fisch. ex DC), radix saponoskiviae (Saponoskivia diversicata (Turcz.) Schisch.), rhizoma atactylodis macrocephalae (Atractyloides macrocephala Koidz.), lonicereae japonicae flos (Lonicera japonica Thunb.) and fructus forsythia (Forsythia suspensa (Thunb.) Vahl). This study revealed that historical use and previous use of the CM in similar epidemics provided clues for selection of CM use and efficacy in COVID-19.
Plants extracts of *Lycoris radiata* (L’Hér.) Herb., *Artemisia annua* L., *Pyroxis lingua* (Thunb.) Farw. and *Lindera aggregata* (Sims.) Kosterm. were also evaluated and found to have anti-SARS-CoV-2 activity after a screening exercise of hundreds of CMs. Apart from whole plant extracts, phytochemicals have been evaluated and shown potential for activity against COVID-19 disease, including Saikosaponins Types A, B2, C, and D (phytochemicals belonging to naturally occurring triterpene glycosides). For example, Saikosaponins from *Bupleurum* spp., *Heteromorpha* spp., *Scrophularia scorodonia* L. have showed antiviral activity against a human and bat corona virus HCoV-229E, that together with OC43, causes the common cold. Furthermore, inhibitors of SARS enzymes (nsP13 helicase and 3CL protease) have also been isolated from plants. For example, myricetin is a flavonoid polyphenolic compound that has anti-oxidant properties. Scutellarein, a flavone isolated from *Scutellaria lateriflora* L., has shown activity against SARS. Phenolic compounds isolated from *Lindis incinera* L., *Torreya nucifera* (L.) Siebold & Zucc. and a water extract of *Houttuynia cordata* Thunb, have also exhibited antiviral mechanisms against SARS. These water extracts have been particularly known to inhibit viral 3CL protease as well as blocking viral RNA-dependent RNA-polymerase activity. Herbal-western medicine combination therapies of lopinavir/ritonavir (anti-HIV medicines), arbidol (broad-spectrum antiviral) and CM Shufeng Jiedu capsule as well as lopinavir/ritonavir and CM Shufeng Jiedu capsule have also been tested clinically. Clinical observations for both herbal-western medicine combination therapies treated patients showed that the TCMs treatments were effective in a majority of the patients that were treated with them, which showed that the TCMs can play a role in treating COVID-19. The Herbal-western medicine combination therapies were very important in the treatment of the viral pneumonia. It was found that more studies were needed to produce conclusive results on the curing capability of the combination therapies on COVID-19.

In the search for chemotherapy for COVID-19, there are different sources of medicines, one of which is traditional medicines or medicinal plants. In the African region including Malawi, treatment options commonly stem from medicinal plants due to their abundance and untapped potential. 80% of the population in this region relies on medicinal plants as a primary health care option. Several studies have already started exploring plants for COVID-19 cure. There may be other unexplored plants that have potential for producing a cure for the disease or addressing mild to severe symptoms. Therefore, it is important to analyse the plants that have shown potential for COVID-19 activity and study plants with similar attributes. The following section explores the literature on plants that have evaluated the efficacy of medicinal plants on SARS-CoV-2 as well as searching for plants with similar antiviral potential in Malawi. For a plant or its isolated compounds to have potential for use in COVID-19, it should be able to kill or inactivate the virus or alleviate the symptoms and complications caused by coronavirus infection.

**Significance of the Study on Medicinal plants with potential for use in COVID-19 in Malawi**

The WHO recommends supportive care options such as the use of supplemental oxygen through ventilators but these interventions are too expensive for most low-income countries with under resourced healthcare systems. Furthermore, there are gaps in trained health care providers for such interventions. The majority of biomedical COVID-19 treatment options available lack data to support their effectiveness. Options that are showing some clinical promise have soaring prices and frequent stock outs. Hence, medicinal plants may be alternatives for individuals in Malawi and other developing countries. Although there have been in-vitro studies that have shown activity for various aspects of COVID-19, there hasn’t been a study completed in Malawi to assess the efficacy or toxicity of medicinal plants. Although various medicinal plants have been analysed abroad, these data cannot be extrapolated to the same species in Malawi since geographical differences have been identified in medicinal plants’ composition and activity. Hence, this study seeks to provide baseline data for use in the discussion of Malawi’s medicinal plants use in COVID-19 treatment. Furthermore, it may confirm or refute widely-circulating arguments or fears concerning the use of medicinal plants against COVID-19. This will be achieved by the following specific objectives: To examine published ethnobotanical studies conducted in Malawi in order to identify the medicinal plants with demonstrated activity or potential for activity against COVID-19 disease. To evaluate the literature for reported pharmacological properties of medicinal plants found to have potential for use in COVID-19 disease.

**Methods**

The authors searched for studies on medicinal plants that are used in Malawi that met the following inclusion criteria: Published in peer reviewed journals that were openly available online between January 1994 and July 2020. Had medicinal plants reported to be found and used in Malawi by at least one ethnobotanical survey as well as being tested in a laboratory. The plant had been linked with antiviral or anti-COVID-19 use or against the symptoms of COVID-19. The key words that were used on Google Scholar and PubMed were: Ethnobotany, ethnobotanical survey, Malawi, Malawi herbal medicine, Malawi herbalist, Malawi medicinal plant, Malawi phytochemical screening, Malawi herbs and traditional medicine. Eleven (11) studies met the inclusion criteria while over 93 studies were excluded because plants reported were not cited in the ethnobotanical surveys reported in Malawi. All plant extracts that had potential for use in COVID-19 were considered. That potential was shown by its local use on viral infections or antiviral activity (e.g., curative action against pneumonia and inflammation), COVID-19 symptoms (symptom management of cough, difficulty in breathing, pain/aches, fever, diarrhoea, rheumatism and fatigue) and risk factors (high risk comorbidities like asthma, immunocompromise and cardiovascular diseases).

For the plants that met the above criteria, further searches were conducted on Google Scholar and PubMed using key words: scientific or botanical name of the plant, phytochemicals, bioactivity and pharmacological activity to find out if there have been any laboratory studies in Malawi or any other country to evaluate their biological or pharmacological activity on COVID-19 and consequent diseases. Summaries of all the studies and plants were created using Microsoft Excel.
Results
The literature search found a total of 11 studies. Plant list extraction yielded 306 plant species thereafter removing species that were irrelevant or not identified by a botanist (Additional File 1: Table 1). Of these 306 medicinal plants, 127 plants were found to manage at least one of the symptoms related to COVID-19 or were found to be used for the management of viral infections (Additional File 2: Table 2). Table 3 shows a summary of the results shown in the Additional File 2.

This study revealed that 87 of 127 medicinal plants could be used for pain or aches management, and two of those for fever management (Azadirachta indica A. Juss. and Pyrenacantha kaurabassana Baill.). Pneumonia is another symptom associated with COVID-19. In this study, we found 9 medicinal plants that are used traditionally to manage pneumonia and 5 that have potential for use in managing breathing or asthma problems. Other diseases associated with COVID-19 for which we identified traditional medicines included coughing (11 plants), diarrhoea (1 plant), immunosuppression (8 plants), blood related issues (10 plants), fatigue (2 plants), heart problems (11 plants), inflammation (8 plants) and rheumatism (10 plants). COVID-19 is a viral infection and any medicinal plant used for viral diseases has potential of being tested on coronavirus. There were 12 plants found to have been used for viral infections or diseases.

Of the 127 medicinal plants with potential to manage COVID-19 related diseases or symptoms, 30 had more than one disease for which they could be used. Azadirachta indica topped the list with being used for 6 of the 13 COVID-19 related diseases, high risk comorbidities and symptoms followed by Moringa oleifera Lam. Pyrenacantha kaurabassana Baill. and Schlerocarya birrea (A. Rich.) Hochst. that could be used on 4 aspects of COVID-19. Analysis of these 30 plants revealed that they covered all types of the diseases except one; fatigue. Table 4 shows the 30 plant species and their associated benefits for COVID-19 management.

Pharmacological effects of the plants
The 30 plants with activity against one or more aspects of COVID-19 were considered more user-friendly since one entity can be used for multiple purposes. This may lead to a decreased incidence of toxicity and interactions. However, it should also be pointed out that the use of medicinal plants potentially leads to the administration of multiple active compounds (drug promiscuity), and is dangerous as it risks drug resistance and adverse events from unknown drug-drug interactions. Some of the components therein would be administered to the patient in suboptimal doses and others in overdoses, with chances of drug resistance and toxicity.

On the other hand, documented evidence exists that suggests that the use of more than one medicinal plant (polyherbalism) improves the efficacy of the products as well as convenience for patients during administration (dose and frequency). Research also suggests that combining medicinal plants with more than one pharmacological effect can provide even greater benefit. Therefore, the 30 plants with multiple COVID-19 activities were evaluated further using literature review to determine if any studies had been completed to scientifically confirm their traditional ethnobotanical uses. Table 5 shows a summary of studies done so far on the plants. The table shows that the majority of the medicinal plants had phytochemicals linked to several of their COVID-19 symptoms alleviation capabilities and had demonstrated some mechanism of action related to COVID-19 treatment pathways. A few medicinal plants had no studies conducted to confirm their use.

Discussion
This study has demonstrated that there are multiple medicinal plants in Malawi that are being used for disease state management (Additional File 1: Table 1) and that several of these diseases are symptoms associated with COVID-19 (Additional File 2: Table 2). According to the World Health Organization (WHO), patients with mild COVID-19 are recommended to be treated with medicines that manage the presenting symptoms.

The WHO acknowledges that traditional medicines may be sources of new therapies in the search for potential treatments for COVID-19. This is based on the historical integration of medicinal plants into primary healthcare in many areas of the world and on phytochemicals serving as precursor molecules for several commonly used biomedical drugs. This study was completed as a way of supplementing in the search for therapies for COVID-19 since initial selection of potential plant species for plant-derived lead compounds or medicines stems from ethnobotanical surveys. Since the disease is novel, we could not identify a novel medicinal entity with clinically significant SARS-COV-2 activity. However, plants targeting other viruses and associated symptoms might be repurposed in a similar fashion to various conventional medicines. However, the WHO warns against the use of traditional medicines without evaluating them first for efficacy, toxicity, and safety. Although WHO recognizes that traditional, complementary and alternative medicines show beneficial effects, and that Africa has a long history of traditional medicine use, medicinal plants can also be toxic and medicinal plants’ efficacy may vary due to differences in geographical locations.

The majority of the 30 medicinal plants identified contained known phytochemicals (Table 4 and 5). The review of the pharmacological effects of the plants confirms why they have potential for testing in the management of COVID-19 patient symptoms and eliminating the virus. The results, for example on Azadirachta indica, are consistent with the results reported by Roy and Bhattacharyya (2020), Shanmuga (2020), as well as Shanmuga et al., (2020) that also showed the potential of this plant in review, computational work, and clinical case study respectively.

Furthermore, the study results are similar to those of Li et al who describe the Shufeng Jiedu Capsule/Granule (SFJD) containing eight herbal medicinal herbs in China that is reported to have antiviral, antibacterial, antitumor, and anti-inflammatory activities, and have effective protection against lung injury and neuronal loss achieved through enhancement of autophagy and apoptosis reduction in rats with allergic rhinitis. It is also reported to improve Pseudomonas aeruginosa-induced upper respiratory tract infection by acting on various targets, particularly ERK phosphorylation. When combined with oseltamivir treatment, SFJD reduced IAV-induced airway inflammation and pulmonary virus titres. This suggests that SFJD may be used for the prevention and treatment of infectious diseases by regulating various signal pathways.

This study can assist WHO’s efforts to select traditional medicine products that can be investigated for clinical efficacy and safety in COVID-19. The WHO has historically supported clinical trials of traditional medicine products.
Through these previous WHO trials, 89 products have been given market authorisation in 14 countries after meeting international and national requirements for registration. Furthermore, 43 products were included in national essential medicines lists for diseases including malaria, opportunistic infections related to HIV, diabetes, sickle cell disease and hypertension. This report recommends that the medicinal plants identified be evaluated as potential sources of COVID-19 management remedies and be prioritized for inclusion in clinical and analytical studies for antiviral activity or management of COVID-19 disease.

**Conclusions**

Coronaviruses have been in existence for decades and novel strains will continue to emerge. Efforts to find viable, safe and effective treatments in drug discovery pipelines are continuing and will adapt in response to evolving strains. From various community practices across the world, natural products have played a significant role in managing coronavirus related diseases to varying extents. As the aetiology of COVID-19 disease is studied further at the molecular and enzyme levels, a narrower selection can be made for potential hits and leads effective against the disease. Natural products, including plant products, are undoubtedly a promising source of compounds in drug development for possible drug leads and vaccines. It is recommended that multidisciplinary approaches are used to study active phytochemicals with regard to identifying suitable compounds that can be used as they are or developed into possible treatments against Covid-19 and other related coronavirus diseases.

**Acknowledgements**

We thank Dr David Scott for assisting with the editing of the paper.

**References**

1. Parvez MK, Parveen S. Evolution and Emergence of Pathogenic Viruses: Past, Present, and Future. Intervirology. 2017; 60 (1-2): 1-7.
2. Ball MJ, Lukiw WJ, Kammerman EM, Hill JM. Intracerebral propagation of Alzheimer’s disease: strengthening evidence of a herpes simplex virus etiology. Alzheimers Dem. 2013; 9 (2): 169-175.
3. Hofer D, Sane F, Jaidane H, Riedweg K, Goffard A, DesaiLoud R. Immunology in the clinic review series; focus on type 1 diabetes and viruses: role of antibodies enhancing the infection with Coxackievirus-B in the pathogenesis of type 1 diabetes. Clin. Exp. Immunol. 2012; 168 (1):47-51.
4. Morgan RL, Baack B, Smith BD, Yartel A, Pitasi M, Falck-Ytter Y. Eradication of hepatitis C virus infection and the development of hepatocellular carcinoma: a meta-analysis of observational studies. Am Intern Med. 2013; 158: 329-337.
5. Herrington CS, Coates PJ, Duprex WP. Viruses and disease: emerging concepts for prevention, diagnosis and treatment. J Pathol.2015; 235(2):149-152.
6. Christou L. The global burden of bacterial and viral zoonotic infections. Clin Microbiol Infect.2011; 17(3): 326-330.
7. Cascio A, Bosilkovski M, Rodriguez-Morales AJ, Pappas G. The socio-ecology of zoonotic infections. Clin. Microbiol. Infect. 2011; 17(3): 336-342.
8. Grais RF, Strebel P, Mala P, Watson J, Nandy R, Gayer M. Measles vaccination in humanitarian emergencies: a review of recent practice. Confl Health. 2011; 5(2):21.
9. Lin CC, Hsu LT, Lin WC. Antiviral natural products and herbal medicines. J. Trad. complement. 2014; 4(1): 24-35.
10. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern.Lancet. 2020; 395(10223): 470-473.11. Singhal T. A Review of Coronavirus Disease-2019 (COVID-19). Indian J. Paediatr. 2020; 87(4): 281-286.
11. Kim D, Chang H. The architecture of SARS-CoV-2 transcriptome. Cell. 2020; 181(4): 914-921.
12. de Groot RJ, Baker SC, Baric R, Enjuanes L, Gorbaleyn AE, Holmes KV. et al. Family Coronaviridae. In King AM, Lefkowitz E, Adams MJ, Carstens EB, International Committee on Taxonomy of Viruses, International Union of Microbiological Societies. Virology Division (eds). 2011, Ninth Report of the International Committee on Taxonomy of Viruses. Oxford: Elsvier., pp. 806-1820.
13. de Groot RJ, Baker SC, Baric R, Enjuanes L, Gorbaleyn AE, Holmes KV. et al. Family Coronaviridae. In King AM, Lefkowitz E, Adams MJ, Carstens EB, International Committee on Taxonomy of Viruses, International Union of Microbiological Societies. Virology Division (eds). 2011, Ninth Report of the International Committee on Taxonomy of Viruses. Oxford: Elsvier., pp. 806-1820.
14. Kim YS, Lau SK, Yuen KY. Coronavirus genomics and bioinformatics analysis. Viruses. 2010; (2): 1804-1820.
15. Yang JL, Ha TKQ, Oh WK. Discovery of inhibitory materials against PEDV corona virus from medicinal plants. The Japanese J. Veteri. Res.2016; 64: 553-563.
16. Koyama T, Platt D, Parida L. Variant analysis of SARS-CoV-2 genomes. Bulletin of the World Health Organisation. 2020; 98: 495-504.
17. Kim JM, Chung YS, Jo HJ, Lee NJ, Kim MS, Woo SH. et al. Identification of Coronavirus Isolated from a Patient in Korea with COVID-19. Osong pub. health res. perspet.2020; 11(1): 3-7.
18. Koyama T, Platt D, Parida L. Variant analysis of SARS-CoV-2 genomes. Bulletin of the World Health Organisation. 2020; 98: 495-504.
19. Kim JM, Chung YS, Jo HJ, Lee NJ, Kim MS, Woo SH. et al. Identification of Coronavirus Isolated from a Patient in Korea with COVID-19. Osong pub. health res. perspet.2020; 11(1): 3-7.
20. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. Engl J Med. 2020; 382(10): 970-971.
21. Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, Yu J, Kang M, Song Y, Xia J, Guo Q, Song T, He J, Yen HL, Peiris M, Wu JN. SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. Engl J Med. 2020; 382(12): 1177-1179.
22. Cheng ZJ, Shan J. 2019 novel coronavirus: where we are and what we know. Infection. 2020; 48(2): 155-163.
23. Kim YS, Lau SK, Yuen KY. Coronavirus genomics and bioinformatics analysis. Viruses. 2010; (2): 1804-1820.
24. World Health Organisation (WHO). Modes of transmission of virus causing COVID-19: Implications for IPC precaution recommendations. [Online] 29 March 2020. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/. Accessed on 20/09/2020.
25. Feng ZJ, Shan J. 2019 novel coronavirus: where are we and what we know. Infection. 2020; 48(2): 155-163.
26. Furukawa NW, Brooks JT, Sobel J. Evidence supporting transmission of severe acute respiratory syndrome coronavirus 2 while presymptomatic or asymptomatic. Emerg Infect Dis. 2020; 26(7): e201595.
27. Wark P. Here’s what we know so far about the long-term symptoms of COVID-19. The Conversation. July 26, 2020. www.theconversation.27. Wark P. Here’s what we know so far about the long-term symptoms of COVID-19. The Conversation. July 26, 2020. www.theconversation.
30. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020; 395: 507-513.

31. Panyod S et al. Dietary therapy and herbal medicine for COVID-19 prevention: A review and perspective. Journal of traditional and complementary medicine. 2020; 10(4): 420-427.

32. Beigel JH, Fishberg RW, ACTT-1 Study Group Members. Remdesivir for the Treatment of Covid-19 - Preliminary Report. COVID-19 Publications by UMMS Authors. 2020.

33. Jin YH, Cai L, Cheng ZS, et al. A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus [2019-nCoV] infected pneumonia [standard version]. Mil Med Res. 2020; 7(4).

34. Zhang L, Liu YJ. Potential interventions for novel coronavirus in China: A systematic review. Med. Virol. 2020; 92(5): 479-490.

35. Expert consensus on chloroquine phosphate for the treatment of novel coronavirus pneumonia. Multicenter collaboration group, Department of Science and Technology of Guangdong Province and Health Commission of Guangdong Province, Chloroquine in the treatment of novel coronavirus. Zhonghua Jie He He Hu Xi Za Zhi. 2020; 43(0):E019.

36. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, et al. First Case of 2019 Novel Coronavirus in the United States., Washington State 2019-nCoV Case Investigation Team. Engl. J. Med. 2020; 382(10): 929-936.

37. Russell CD, Millar JE, Baillie JK. Clinical evidence does not support corticosteroid treatment for 2019-nCoV lung injury. Lancet. 2020; 395: 473-475.

38. Zhao JP, Hu Y, Du RH, et al. Expert consensus on the use of corticosteroid in patients with 2019-nCoV pneumonia. Zhonghua Jie He He Hu Xi Za Zhi. 2020; 43(0): E007.

39. Covid-19: Demand for dexamethasone surges as RECOVERY trial publishes preprint. BMJ. 2020; 369.

40. Aanouz I, Belhassan A, Khatabi KE, Lakhlifi T, Idrissi ME. Bouachrine M. Moroccan Medicinal plants as inhibitors of COVID-19: Computational investigations. J. Biomolec. Structure and Dynam. 2020: 1-9.

41. Soleymani S, Zabihollahi R, Shahbazi S, Bolhassani A. Antiviral effects of saffron and its major ingredients. Curr. Drug Deliv. 2018; 15(5): 698-704.

42. Boff L et al. Potential anti-herpes and cytotoxic action of novel semisynthetic digitoxygenin-derivatives. Eur. J. Med. Chem. 2019; 167: 546-561.

43. Astani A, Reichling J, Schnitzler P. Screening for antiviral activities of isolated compounds from essential oils. Evid. Based Complement. Alternat. Med. 2011; 2011.

44. Zhang XR, Kaunda JS, Zhu HT, Wang D, Yang CR, Zhang YJ. The Genus Terminalia (Combretaceae): An Ethnopharmacological, of Historical Classics, Research Evidence and Current Prevention for Prevention of Corona Virus Disease 2019 (COVID-19)? A Review Bioprospect. 2019; 9: 357-392.

45. Robinson L, Sclar D, Scaer T. Medicinal Plant Use by Traditional districts of Malawi. Ethnobot. Res. Appl. 2010; 8:75-93.

46. Manda L. Status and uses of Oldfieldia dactylophylla (Euphorbiaceae) wild trees in Malawi. For. Ecol. Manage. 1994; 64: 245-248.

47. Saka JD, Msonthi JD. Nutritional value of edible fruits of indigenous plants in the traditional authority Chikowi in Zomba, Malawi. Current Ethnopharm. 2008; 118(1): 79-85.

48. Wang Z, Chen X, Lu Y, Chen F, Zhang W. Clinical characteristics and therapeutic procedure for four cases with 2019 novel coronavirus pneumonia receiving combined Chinese and Western medicine treatment. BiSci. Trends. 2020; 14(1): 64-68.

49. Oyebode O, Kandala NB, Chilton PJ, Lilford RJ. Use of traditional medicine in middle-income countries: a WHO-SAGE study. Health Policy Plan. 2016; 31(8): 984-991.

50. Zhang D, Wu K, Zhang X, Deng S, Peng B. In silico screening of Chinese herbal medicines with the potential to directly inhibit 2019 novel coronavirus. J. Integ. Med. 2020; 18(1): 152-158.

51. World Health Organisation (WHO). WHO supports scientifically-proven traditional medicine. 2020. www.afro.who.int/news/who-supp. Accessed on 25/07/2020.

52. Loayza NV. Costs and Trade-Offs in the fight against the COVID-19 Pandemic: A Developing Country Perspective (English). Research and Policy Briefs. Washington DC : World Bank Group, 2020.

53. Gadabu A. Malawi’s Response, Risk Factors, and Preparedness for COVID-19. North American Academic Research –NAAR. 2020(3): http://doi.org/10.5281/zenodo.3732795.

54. Rajagopal D. Hydroxychloroquine becomes a Schedule H1 drug as hoarding leads to shortage. Economics Times. Mar 27 2020. www. economictimes.com/industry/healthcare/biotech/ pharmaceuticals/hydroxychloroquine-becomes-a-schedule-h1-drug-as-hoarding-leads-to-shortage/articleshow/74842650.cms.

55. Nafiu MO, Hamid AA, Muritala HF Adeyemi SB. Chapter 7 - Costs and Trade-Offs in the fight against the COVID-19 Pandemic: A Developing Country Perspective (English). Research and Policy Briefs. Washington DC : World Bank Group, 2020.

56. Robinson L, Sclar D, Scaer T. Medicinal Plant Use by Traditional districts of Malawi. Ethnobot. Res. Appl. 2010; 8: 75-93.

57. Saka JD, Msonthi JD. Nutritional value of edible fruits of indigenous plants in the traditional authority Chikowi in Zomba, Malawi. Current Ethnopharm. 2008; 118(1): 79-85.

58. Saka JD, Msonthi JD. Nutritional value of edible fruits of indigenous wild trees in Malawi. For. Ecol. Manage. 1994; 64: 245-248.

59. Mwafongo E, Njue M. Mkyenye M, Jere S, Mtwasa AG, Mponda J, Lampiao F. An ethnomedicinal survey of indigenous knowledge on medicinal plants in the traditional authority Chikowi in Zomba, Malawi. Current Traditional Medicine. 2020; 5(1).

60. Robinson L, Sclar D, Scaer T. Medicinal Plant Use by Traditional districts of Malawi: Focus on Neem, Tephrosia, Moringa, Jatropha, Marula and Natal Mahogany. Malawi Agroforestry Extension Project. 2002: 11-18.

61. Saka JD, Msonthi JD. Nutritional value of edible fruits of indigenous wild trees in Malawi. For. Ecol. Manage. 1994; 64: 245-248.

62. Robinson L, Sclar D, Scaer T. Medicinal Plant Use by Traditional districts of Malawi: Focus on Neem, Tephrosia, Moringa, Jatropha, Marula and Natal Mahogany. Malawi Agroforestry Extension Project. 2002: 11-18.

63. Saka JD, Msonthi JD. Nutritional value of edible fruits of indigenous wild trees in Malawi. For. Ecol. Manage. 1994; 64: 245-248.

64. Manda L, Status and uses of Oldfieldia dactylophylla (Euphorbiaceae) in Malawi. Uppsala : CBM Master Theses No. 38. Swedish Biodiversity Centre (CBM), SLU, Box 7007, SE-750 07; 2007; Uppsala, Sweden.

65. Malwiche-Nyirenda CP, Malwiche LL. Medicinal plants used for contraception and pregnancy-related cases in Malawi: A case study of Mulanje District. Journal of Medicinal Plants Research. 2010; 4(20): 3024-3030.

66. Gordon CN. People and protected areas: Natural resource management in Mulanje District. Journal of Medicinal Plants Research. 2010; 4(20): 3024-3030.
harvesting as an approach to support rural communities surrounding Majete Wildlife Reserve, Southern Malawi. Capetown : Masters thesis. Stellenbosch University, South Africa. 2017.

67. Bundschuh TV, Hahn K, Wittig R. The Medicinal Plants of the Woodlands in northern Malawi (Karonga District). Flora et Vegetatio Sudano-Sambesiaca.2011; 14: 3-8.

68.Maliwichi-Nyirenda CP. The conservation biology of Berberis holstii engl. in Nyika national park, Malawi. Plymouth : University of Plymouth Research Theses. 2008.

69. Kayambazinthu D, Barany M, Mumba R, Anyonge CH. Miombo woodlands and HIV/AIDS interactions: Malawi Country Report. Food and Agriculture Organization of the United Nations. Forestry Policy and Institutions Working Paper 6. Rome : FAO, 2005.

70.Chisaka JW. The use of traditional herbal medicines among palliative care patients at Mulanje Mission Hospital, Malawi. Capetown : Faculty of Health Sciences, Department of Public Health and Family Medicine, University of Capetown.2019.

71. Mei Y, Yang B. Rational application of drug promiscuity in medicinal chemistry. Future medicinal chemistry. 2018; 10(15).

72. Parasuraman S, Thing GS, Dhanaraj SA. Polyherbal formulation: Concept of ayurveda. Pharmacogn. Rev. 2014; 8(16): 73-80.

73. Yang Y. Use of herbal drugs to treat COVID-19 should be with caution. The Lancet. 2020; 395(10238): 395.

74. Roy S, Bhattacharyya P. Possible role of traditional medicinal plant Neem (Azadirachta indica) for the management of COVID-19 infection. International Journal of Research in Pharmaceutical Sciences..2020; 11(SPL1): 122-125.

75. Shanmuga SS. Some Compounds from Neem leaves extract exhibit binding affinity as high as -14.3 kcal/mol against COVID-19 Main Protease (Mpro): A Molecular Docking Study. Molecular Biology.2020. DOI: 10.21203/rs.3.rs.2564/v1.

76. Shanmuga SS, Kanitkar PM, Neeta, Shirish K. Neem (Azadirachta Indica) leaves in the treatment of COVID19/SARS-CoV-2 : A Case Report. Figshare. 2020; Figshare. Preprint.

77. Li C, Wang L, Ren L. Antiviral mechanisms of candidate chemical medicines and traditional Chinese medicines for SARS-CoV-2 infection [published online ahead of print, 2020 Jun 24].Virus Res.2020; 286(198073).

78. Ramadass N, Subramanian N. Study of phytochemical screening of neem (Azadirachta indica). Int. J. Zoo. Studies.2018; 3(1): 209-212.

79. Dash SP, Dixit S, Sahoo S. Phytochemical and Biochemical Characterizations from Leaf Extracts from Azadirachta Indica: An Important Medicinal Plant. Biochem. Anal. Biochem.2017; 6(323).

80. Arora R, Chawla R, Marwah R, et al. Potential of Complementary and Alternative Medicine in Preventive Management of Novel H1N1 Flu (Swine Flu) Pandemic: Thwarting Potential Disasters in the Bud. Evid Based Complement Alternat Med. 2011; 2011.

81. Bhowmik D, Chiranjib, Yadav J, Tripathi KK, Kumar KPS. Herbal Medicines and Traditional Chinese Medicines for SARS-CoV-2 Infection. Asian J. Trop. Biomed. 2011; 1(4): 330-333.

82. Roy S, Bhattacharyya P. Possible role of traditional medicinal plant Neem (Azadirachta indica) for the management of COVID-19 infection. International Journal of Research in Pharmaceutical Sciences..2020; 11(SPL1): 122-125.

83. Priyadarshi A, Ram B. A review on pharmacognosy, phytochemistry and pharmacological activity of Carica papaya (linn) leaf. Int J Pharm Sci & Res.2018; 9(10): 4071-78.

84. Srivastava S, Sivastava M, Misra A, Pandey G, Rawat A. A review on biological and chemical diversity in Berberis (Berberidaceae). EXCLI J. 2015; 14: 247-267.

85. Kimani NL, Njagiro IK, Njagi ENM, Orinda GO. Antidiabetic activity of administration of aqueous extract of Berberis holstii. 11, 2017, J. Diabetes Metab., Vol. 8.

86. Maroyi A. Azanza garckeana Fruit Tree: Phytochemistry, Pharmacology, Nutritional and Primary Healthcare Applications as Herbal Medicine: A Review. Res. J. Med. Plants. 2017; 11: 115-123.

87. Yusuf AA, Lawal B, Sani S. et al. Pharmacological activities of Azanza garckeana (Goron Tula) grown in Nigeria. Clin. Phytosci. 2020; 6: 27.

88. Srivastava S, Srivastava M, Misra A, Pandey G, Rawat A. A review on biological and chemical diversity in Berberis (Berberidaceae). EXCLI J. 2015; 14: 247-267.

89. Kimani NL, Njagiru IK, Njagi ENM, Orinda GO. Antidiabetic activity of administration of aqueous extract of Berberis holstii. 11, 2017, J. Diabetes Metab., Vol. 8.

90. Pathy K. The Influenza a Virus Subtypes H1N1, H1N2 and H3N2, HDFx: A Novel Immunomodulator and Potential Fighter Against Cytokine Storms in Viral Flu Infections- Carica Papaya Linn. Int. J. clin. Case. 2017; 18(1): 159-165.

91. Ahmad N, Fazal H, Ayaz M, Abbasi BH, Mohammad I, Fazal L. Dengue fever treatment with Carica papaya leaves extracts. Asian Pac. J. Trop. Biomed. 2011; 1(4): 330-333.

92. Srikanth BK, Reddy L, Biradar S, Shamanna M, Mariguddi DD, Krishnakumar M. An open-label, randomized prospective study to evaluate the efficacy and safety of Carica papaya leaf extract for thrombocytopenia associated with dengue fever in pediatric subjects. Pediatric Health Med. Ther. 2019; 10: 5--11.

93. Priyadarshi A, Ram B. A review on pharmacognosy, phytochemistry and pharmacological activity of Carica papaya (linn) leaf. Int J Pharm Sci & Res.2018; 9(10): 4071-78.

94. Srivastava S, Sivastava M, Misra A, Pandey G, Rawat A. A review on biological and chemical diversity in Berberis (Berberidaceae). EXCLI J. 2015; 14: 247-267.

95. Bhatakgar S, Sahoo S, Mohapatra AK, Behera DR. Phytochemical analysis, Antioxidant and Cytotoxic activity of medicinal plant Combretum roxburghii (Family: Combretaceae). Int. J. Drug Dev. & Res.2012; 4(1): 193-202.

96. de Morais LGR, de Sales IRP, Caldas FMRD, et al. Bioactivities of the genus Combretum (Combretaceae): A review. Molecules. 2012; 17: 9142–206.

97. Makhabola TJ, Elgorashi EE, McGaw LJ, Awouafack MD, Verschaeve L, Eloff JN. Isolation and characterization of the compounds responsible for the antimutagenic activity of Combretum microphyllum (Combretaceae) leaf extracts. BMC Complement Altern Med. 2017; 17(1): 446.

98. Maroyi A. Dicoma anomala sensd: A Review of its botany, ethnomedicine, phytochemistry and pharmacology. Asian J. Pharmaceut. Clin. Res. 2018; 11(6): 70.

99. Eramma N, Gayathri D. Antibacterial potential and phytochemical analysis of Flacourtia indica (Burm.f.) Merr. Int. J. Pharm Pharmaceut. Res.2012; 4(1): 193-202.

100. Priyadarshi A, Ram B. A review on pharmacognosy, phytochemistry and pharmacological activity of Carica papaya (linn) leaf. Int J Pharm Sci & Res.2018; 9(10): 4071-78.

101. Friday E, Thursday T, Wednesday W. Ethnomedicine, phytochemistry and pharmacology. Asian J. Pharm Pharmaceut. Res.2011, J. Diabetes Metab., V ol. 8.
104. Oko AO, Eikibo JC, Idenyi JN. Nutritional and Phytochemical Compositions of the Leaves of Mucuna Poggei. J. Bio. Life Sci. 2012; 3(1): 232.

105. Vongtau H, Amos S, Hohn-Africa LB. Pharmacological effects of the aqueous extract of Neorautanenia mitis in rodents. Journal of Ethnopharmacology. 2000; 72(1-2): 207-14.

106. Dawurung CJ, Gotep JG, Usman JG, Asekun OT, Familoni OB, Lombin LH, Pyne SG. Antidiarrheal activity of some selected medicinal plants used in traditional medicine. Phcog. Res. [serial online]. 2019; 11:371-7.

107. Afolayan M, Srivedavyasasri R, Asekun OT, Familoni OB, Orishadipe A, Zulfiqar F. et al. Phytochemical study of Piliostigma thonningii, a medicinal plant grown in Nigeria. Med. Chem. Res.2018; 27: 2325-2330.

108. Omolo JJ, Maharaj V, Naidoo D, Klimkait T, Malebo HM, Mtullu S, Lyaruu HM, de Koning CB. Bioassay-Guided Investigation of the Tanzanian Plant Pyrenacantha kaurabassana for Potential Anti-HIV-Active Compounds. J. Nat. Prod. 2012; 75(10): 1712-1716.

109. Russo D, Kenny O, Smyth T, Milella L, Hossain M, Diop M, Rai D, Brunton N. Profiling of Phytochemicals in Tissues from Sclerocarya birrea by HPLC-MS and Their Link with Antioxidant Activity.ISRN Chromatography. 2013: 1-11.

110. John AO, Ojewole, Mawoza T, Witness DH, Chiwororo, Peter MO. Sclerocarya birrea (A. Rich) Hochst. [‘Marula’] (Anacardiaceae): A Review of its Phytochemistry, Pharmacology and Toxicology and its Ethnomedicinal Uses. Phytother. Res.2010; 24: 633-639.

111. Pallant CA, Cromarty AD, Steenkamp V. Effect of an alkaloidal fraction of Tabernaemontana elegans (Stapf.) on selected micro-organisms. J Ethnopharmacol.2012; 140(2): 398-404.

112. Hapsari BW, Martin AF, Maulana E, Ermayanti TM. Growth, phytochemical properties, and antioxidant activity of in vitro-gamma irradiated Tacca leontopetaloides (L.) Kunzite. AIP Conference Proceedings. 2019; 2199.

113. Mikindi AG, Tembo Y, Mbega ER, et al. Phytochemical Analysis of Tephrosia vogelii across East Africa Reveals Three Chemotypes that Influence Its Use as a Pesticidal Plant. Plants (Basel). 2019; 8(12): 597.

114. Yadeta NC, Tessema SS. Phytochemical Investigation and characterisation of the chemical constituents from root extracts of Tephrosia vogelii. International Journal of Novel Research in Engineering and Science. 2019; 6(2): 1-14.

115. Mongaloa NI, McGawa LJ, Segapelod TV, Finniea JF, Van Staden VJ. Ethnobotany, phytochemistry, toxicology and pharmacological properties of Terminalia sericea Burch. ex DC. (Combretaceae) – A review. J. Ethnopharmac. 2016; 194: 789-802.

116. Viol DI. Screening of traditional medicinal plants from Zimbabwe for phytochemistry, antioxidant, antimicrobial, antiviral and toxicological activities. School of Pharmacy, College of Health Sciences, University of Zimbabwe Thesis. 2009.

117. Cock IE. The medicinal properties and phytochemistry of plants of the genus Terminalia (Combretaceae). Inflammopharmacol.2015; 23(5): 203-29.

118. Konate K, Yomalay K, Sytar O, Brestic M. Antidiarrheal and antimicrobial profiles extracts of the leaves from Trichilia emetica Vahl. (Meliaceae)KK. Asian Pacific Journal of Tropical Biomedicine.2015; 5(3): 242-248.

119. Brigitte KML, Flaurant TT, Emmanuel T. Antimicrobial, Antioxidant and Protective Effect of Methanol Extract of Trichilia emetica (Meliaceae) Stem and Root Bark against Free Radical-induced Oxidative Haemolysis. EJMP [Internet].2017; 19(1): 1-4.

120. Maroyi A. Zanha africana (Radlk.) Exell: review of its botany, medicinal uses and biological activities. Pharm. Sci. & Res.2019; 11(8): 2980-2985.

121. Bode AM, Dong Z. Chapter 7. The Amazing and Mighty Ginger. In: Benzie IFF, Wachtel-Galor S, eds. Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Available from: https://www.ncbi.

122. Chang JS, Wang KC, FengYeh CF, Shieh DE, Chiang LC. Fresh ginger (Zingiber officinale) has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines. Journal of Ethnopharmacology. 2013; 145(1): 146-151.

123. Koh EM, Kim HJ, Kim S, eds. et al. Modulation of macrophage functions by compounds isolated from Zingiber officinale. Planta Med. 2009; 75(2): 148-51.

124. de Groot RJ, Baker SC, Baric RS, et al. Middle East respiratory syndrome coronavirus (MERS-CoV); announcement of the Coronavirus Study Group. J Virol. 2013; 87(14): 7790-7792.
Table 1: List of Medicinal Plants that were included in the study

| Common Name | Scientific Name |
|-------------|-----------------|
| Afromosia africana | Afromosia africana |
| Acacia adansonii | Acacia adansonii |
| Acacia amplexicaulis | Acacia amplexicaulis |
| Acacia nilotica | Acacia nilotica |
| Acacia nilotica var. ephieanthes | Acacia nilotica var. ephieanthes |
| Acacia nilotica var. elongata | Acacia nilotica var. elongata |
| Acacia nilotica var. haematoxylon | Acacia nilotica var. haematoxylon |
| Acacia nilotica var. leucophloia | Acacia nilotica var. leucophloia |
| Acacia nilotica var. orientalis | Acacia nilotica var. orientalis |
| Acacia nilotica var. pubescens | Acacia nilotica var. pubescens |
| Acacia nilotica var. rufa | Acacia nilotica var. rufa |
| Acacia nilotica var. tappehnii | Acacia nilotica var. tappehnii |
| Acacia nilotica var. tomentosa | Acacia nilotica var. tomentosa |
| Acacia nilotica var. williamsii | Acacia nilotica var. williamsii |
| Acacia nilotica var. xanthocarpa | Acacia nilotica var. xanthocarpa |
| Acacia polyacantha | Acacia polyacantha |
| Acacia senegalica | Acacia senegalica |
| Acacia seyal | Acacia seyal |
| Acanthocalyx wilsonii | Acanthocalyx wilsonii |
| Acanthocereus pedatus | Acanthocereus pedatus |
| Acanthocereus peruvianus | Acanthocereus peruvianus |
| Acanthocereus tetragonus | Acanthocereus tetragonus |
| Acanthus ilicifolius | Acanthus ilicifolius |
| Acanthus mollis | Acanthus mollis |
| Acanthus spinosus | Acanthus spinosus |
| Acanthus telephium | Acanthus telephium |
| Acanthus viscosus | Acanthus viscosus |
| Acanthus xanthographus | Acanthus xanthographus |
| Acanthus xanthographus var. brittonii | Acanthus xanthographus var. brittonii |
| Acanthus xanthographus var. chinensis | Acanthus xanthographus var. chinensis |
| Acanthus xanthographus var. hortensis | Acanthus xanthographus var. hortensis |
| Acanthus xanthographus var. japonicus | Acanthus xanthographus var. japonicus |
| Acanthus xanthographus var. obtusifolius | Acanthus xanthographus var. obtusifolius |
| Acanthus xanthographus var. puniceus | Acanthus xanthographus var. puniceus |
| Acanthus xanthographus var. sinicus | Acanthus xanthographus var. sinicus |
| Acanthus xanthographus var. thunbergii | Acanthus xanthographus var. thunbergii |
| Acanthus xanthographus var. turgidus | Acanthus xanthographus var. turgidus |
| Acanthus xanthographus var. variegatus | Acanthus xanthographus var. variegatus |
| Acanthus xanthographus var. villoso | Acanthus xanthographus var. villoso |
| Acanthus xanthographus var. winteri | Acanthus xanthographus var. winteri |
| Acanthus xanthographus var. yedoensis | Acanthus xanthographus var. yedoensis |
| Acacia nilotica var. variegata | Acacia nilotica var. variegata |
| Acacia senegalica | Acacia senegalica |
| Acacia seyal | Acacia seyal |
| Acanthus ilicifolius | Acanthus ilicifolius |
| Acanthus mollis | Acanthus mollis |
| Acanthus spinosus | Acanthus spinosus |
| Acanthus telephium | Acanthus telephium |
| Acanthus viscosus | Acanthus viscosus |
| Acanthus xanthographus | Acanthus xanthographus |
| Acanthus xanthographus var. brittonii | Acanthus xanthographus var. brittonii |
| Acanthus xanthographus var. chinensis | Acanthus xanthographus var. chinensis |
| Acanthus xanthographus var. hortensis | Acanthus xanthographus var. hortensis |
| Acanthus xanthographus var. japonicus | Acanthus xanthographus var. japonicus |
| Acanthus xanthographus var. obtusifolius | Acanthus xanthographus var. obtusifolius |
| Acanthus xanthographus var. puniceus | Acanthus xanthographus var. puniceus |
| Acanthus xanthographus var. sinicus | Acanthus xanthographus var. sinicus |
| Acanthus xanthographus var. thunbergii | Acanthus xanthographus var. thunbergii |
| Acanthus xanthographus var. turgidus | Acanthus xanthographus var. turgidus |
| Acanthus xanthographus var. variegatus | Acanthus xanthographus var. variegatus |
| Acanthus xanthographus var. villoso | Acanthus xanthographus var. villoso |
| Acanthus xanthographus var. winteri | Acanthus xanthographus var. winteri |
| Acanthus xanthographus var. yedoensis | Acanthus xanthographus var. yedoensis |
| Acacia nilotica var. variegata | Acacia nilotica var. variegata |
| Acacia senegalica | Acacia senegalica |
| Acacia seyal | Acacia seyal |
| Acanthus ilicifolius | Acanthus ilicifolius |
| Acanthus mollis | Acanthus mollis |
| Acanthus spinosus | Acanthus spinosus |
| Acanthus telephium | Acanthus telephium |
| Acanthus viscosus | Acanthus viscosus |
| Acanthus xanthographus | Acanthus xanthographus |
| Acanthus xanthographus var. brittonii | Acanthus xanthographus var. brittonii |
| Acanthus xanthographus var. chinensis | Acanthus xanthographus var. chinensis |
| Acanthus xanthographus var. hortensis | Acanthus xanthographus var. hortensis |
| Acanthus xanthographus var. japonicus | Acanthus xanthographus var. japonicus |
| Acanthus xanthographus var. obtusifolius | Acanthus xanthographus var. obtusifolius |
| Acanthus xanthographus var. puniceus | Acanthus xanthographus var. puniceus |
| Acanthus xanthographus var. sinicus | Acanthus xanthographus var. sinicus |
| Acanthus xanthographus var. thunbergii | Acanthus xanthographus var. thunbergii |
| Acanthus xanthographus var. turgidus | Acanthus xanthographus var. turgidus |
| Acanthus xanthographus var. variegatus | Acanthus xanthographus var. variegatus |
| Acanthus xanthographus var. villoso | Acanthus xanthographus var. villoso |
| Acanthus xanthographus var. winteri | Acanthus xanthographus var. winteri |
| Acanthus xanthographus var. yedoensis | Acanthus xanthographus var. yedoensis |
| Acacia nilotica var. variegata | Acacia nilotica var. variegata |
| Acacia senegalica | Acacia senegalica |
| Acacia seyal | Acacia seyal |
| Acanthus ilicifolius | Acanthus ilicifolius |
| Acanthus mollis | Acanthus mollis |
| Acanthus spinosus | Acanthus spinosus |
| Acanthus telephium | Acanthus telephium |
| Acanthus viscosus | Acanthus viscosus |
| Acanthus xanthographus | Acanthus xanthographus |
| Acanthus xanthographus var. brittonii | Acanthus xanthographus var. brittonii |
| Acanthus xanthographus var. chinensis | Acanthus xanthographus var. chinensis |
| Acanthus xanthographus var. hortensis | Acanthus xanthographus var. hortensis |
| Acanthus xanthographus var. japonicus | Acanthus xanthographus var. japonicus |
| Acanthus xanthographus var. obtusifolius | Acanthus xanthographus var. obtusifolius |
| Acanthus xanthographus var. puniceus | Acanthus xanthographus var. puniceus |
| Acanthus xanthographus var. sinicus | Acanthus xanthographus var. sinicus |
| Acanthus xanthographus var. thunbergii | Acanthus xanthographus var. thunbergii |
| Acanthus xanthographus var. turgidus | Acanthus xanthographus var. turgidus |
| Acanthus xanthographus var. variegatus | Acanthus xanthographus var. variegatus |
| Acanthus xanthographus var. villoso | Acanthus xanthographus var. villoso |
| Acanthus xanthographus var. winteri | Acanthus xanthographus var. winteri |
| Acanthus xanthographus var. yedoensis | Acanthus xanthographus var. yedoensis |
### Table 1 Cont.

| Medicinal Plant | Common Name | Scientific Name |
|-----------------|-------------|-----------------|
| Cissus volundifolia | - | - |
| Octamnus americanum | - | - |
| Olaex dissitiflora | - | - |
| Olaex obtusifolia | - | - |
| Oldfieldia dactylophylla | - | - |
| Ornocarpum kirkii | - | - |
| Ozoeca reticulata | - | - |
| Paederia bojerana | - | - |
| Parinari excelsa | - | - |
| Passiflora edulis | - | - |
| Paulodia mixta | - | - |
| Pericopsis angolensis | - | - |
| Phelipina gilvus | - | - |
| Philenoptera capassa | - | - |
| Philenoptera violacea | - | - |
| Phylicanthus ovalifolius | - | - |
| Phyllanthus reticulatus | - | - |
| Pilostigma thonningii | - | - |
| Plectranthus esculentus N.E. Br | - | - |
| Popowia obovata or Friesodielsia obovata | - | - |
| Portulaca oleracea L | - | - |
| Pouzolzia mixta | - | - |
| Protea petiolaris | - | - |
| Pseudarthria hookeri | - | - |
| Pseudolachnostylis maprouneifolia | - | - |
| Psidium guajava | - | - |
| Psorospermum febrifugum | - | - |
| Pterocarpus angolensis | - | - |
| Pterocarpus brenanii | - | - |
| Pupaia lappacea | - | - |
| Pyrenacantha kauraibassana | - | - |
| Genipus boivini (Decne.) Engl | - | - |
| Raphiophacam welwitschii Schltr. & Rendle | - | - |
| Rhus longipes | - | - |
| Rhus natalensis | - | - |
| Rictinus communis | - | - |
| Rothmannia fisheri | - | - |
| Rytignya adenodonta or Rytignya reticulata | - | - |
| Rytignya monantha | - | - |
| Sclerocarya birrea | - | - |
| Sclerocarya caffra | - | - |
| Searsia tenunervis | - | - |
| Securidaca longepedunculata | - | - |
| Senna siamea or Cassia siamea | - | - |
| Simulax anceps | - | - |
| Solanum anguivi | - | - |
| Solanum panduriforme | - | - |
| Sphaeranthus angolensis | - | - |
| Sphenostylis emarginata | - | - |
| Steganotaeina araliacea | - | - |
| Sterculia quinquelsa | - | - |
| Stereospernum kunthianum | - | - |
| Strophanthus kombé | - | - |
| Strychnos madagascariensis | - | - |
| Stylochiton puberulus N.E. Br | - | - |
| Tabernaemontana elegans | - | - |
| Tacca leontopetaloides | - | - |
| Tamariindus indica | - | - |
| Tephrosia vogeli | - | - |
| Terminalia mollis | - | - |
| Terminalia sericea | - | - |
| Terminalia stenostachya | - | - |
| Tragia brevipes | - | - |
| Tricalysia coriacea | - | - |
| Tricalysia spp. | - | - |
| Trichilia emetica | - | - |
| Trichodesma zeylanicum | - | - |
| Triclerax longepedunculatum | - | - |
| Turraea floribunda | - | - |
| Turraea nilotica | - | - |
| Tylisena fassoglossis (Kotschy ex Schweinf.) Torre & Hillc. | - | - |
| Vangueria infausta | - | - |
| Vernonia adonis | - | - |
| Vernonia colorata | - | - |
| Vigna radiata | - | - |
| Vigna subterranean | - | - |
| Vitis doniana | - | - |
| Vițes mombassae | - | - |
| Vițes payos | - | - |
| Xeroderris stuhlmannii (Taub.) Mendonca & EP Sousa. | - | - |
| Ximenia americana L. | - | - |
| Ximenia caffra | - | - |
| Zanzia africana | - | - |
| Zingiber officinale | - | - |
| Ziziphus abyssinica | - | - |
Table 2: List of Medicinal Plants that were evaluated further for Pharmacological and Physicochemical Properties

| Plant Name                                      | Plant Name                                      |
|------------------------------------------------|------------------------------------------------|
| Abrus precatorius                               | Dicoma anomala Sund.                           |
| Acacia macrophylla                              | Dicoma tunki                                   |
| Acalypha chirindica                             | Dioscorea bulbifera L.                         |
| Avnca lancea                                    | Diplorychnus condylyncarpom                    |
| Anischnonema abyssinica                         | Delichos kilimandscharicus                     |
| Anischnonema nyassana                           | Delichos trimervatus Baker                     |
| Ageratia quinquenervis                          | Ecdiopsis oblongifolia                         |
| Agaratum hovestia (compositae)                  | Ehretia amoema leiochichi                      |
| Albizia zimmermani                              | Ehretia divaricata                             |
| Althea abyssinica Jacq.                         | Ehretia obtusifolia                            |
| Aloe spp.                                       | Elephantorrhiza goetsii                        |
| Allium sativum                                  | Eriopsonnum abyssinicum Baker                  |
| Aloe spp.                                       | Erythrophleum sanguineans                     |
| Althea swynnertonii                             | Fogara chalybea                                |
| Aloe vera                                       | Ficus capensis                                 |
| Ameloncissus Africana (Lour.) Merr.             | Flacourtia indica                              |
| Annona serpentina                               | Fuchsia virosa, Securinega virosa              |
| Azanza garckeana                                | Gonatopus boivini (Deenc.) Engl.               |
| Azedarach indica                                | Grewia micrantha                              |
| Banksia ilhinengii                              | Helianthus arborascens                         |
| Boronis holstii                                 | Helianthus pubescens                           |
| Boophone disticha (L.f)                         | Hymenocardia acida                            |
| Broclystegia tillis                             | Hypoxis villosa L.f                           |
| Brounadia micrantha                             | Ipomoea tanarosstris                          |
| Bridelia micrantha                              | Jatropha curcas                                |
| Burkea africana                                 | Kaempferia rosae Schweinf. ex Baker            |
| Capsicum frutescens                             | Kigelia africana                               |
| Carica papaya                                   | Lannea adulis                                 |
| Carissa adulis                                  | Lotus sp.                                     |
| Cassia abbreviata                               | Markhamia obtusifolia                         |
| Caiba pantandra                                 | Mela azadarach                                |
| Cassympolus macranata                           | Momordica foetida Schumach & Thonn.           |
| Cassius quadrangularis                          | Moringa oleifera                              |
| Cassius rubigenous (Welw ex Baker) Plantch.     | Mucuna peggii Taub.                           |
| Cassius sombrensis (Baker) Gilg & M. Brandt    | Meliodendron crassa                           |
| Combretum microphyllum                          | Musa paradisica                                |
| Coreherus trilocularis                          | Neorhandia mitis (A.Rich.) Verdc.             |
| Cordyla africana                                | Nidorailla auriculata                          |
| Crinum macowanii Baker                          | Oldfieldia dactylophylla                       |
| Crotan megalobrestys                             | Parinari excelso Salme                         |
| Cassania arboidea                               | Pariecopsis angolensis                        |
| Cyphostemma spp.                                | Phelianthus pilulus                           |
| Cyphostemma junceanum (Webb)                    | Phyllanthus reticulatus                       |
| Dalbergia nyassae, Swartzia madagascariensis    | Ptilostigma ilhinengii                        |

https://dx.doi.org/10.4314/mmj.v33i2.4
Table 2 Cont....

| Dichrostachys cinerea       | Pseudolachnosiylis maprouneifolia |
|----------------------------|----------------------------------|
| Psorospermum febrifugum     | Tricalysia coriacea              |
| Pterocarpus angolensis      | Tricalysia spp.                  |
| Pyrenacantha kaurabassana Baill. | Trichilla emetica               |
| Rauvolfia caffra            | Trichodesma zeylanicum           |
| Rhus longipes               | Turraea floribunda               |
| Rothmannia fischeri         | Turraea nilotica                 |
| Schrebera trichococlada     | Tylosema fassoglesis (Kotschy ex Schweinf.) |
| Sclerocarya birrea          | Torre & Hillc.                   |
| Searsia temunervis          | Uapaca kirkiana                  |
| Senna persitiana            | Vernonio corolata                |
| Senna sengueana             | Vigna radiata                    |
| Sphaeranthes angolensis     | Vitex mombassae                  |
| Steganotaenia araliacea     | Xeroderris stuhlmannii (Taub.) Mendonca & EP Sousa. |
| Strychnos innocua           | Ximenia americana                |
| Tabernaemontana elegans     | Ximenia caffra                   |
| Tacca leontopetaloides (L.) Kuntze | Xylopia perviflora              |
| Tephrosia vogeli            | Zanha africana                   |
| Terminalia sericea          | Zingiber officinale              |
| Thunbergia spp.             |                                  |
Table 3: Number of plants found to be used for each of the COVID-19 related diseases or symptoms

| Variable            | Frequency n=306 | Percentage |
|---------------------|-----------------|------------|
| Cough               | 11              | 3.59       |
| Pneumonia           | 9               | 2.94       |
| Breath/Asthma       | 5               | 1.63       |
| Pain/Aches          | 87              | 28.43      |
| Fever               | 2               | 0.65       |
| Diarrhoea           | 1               | 0.33       |
| Immunity            | 8               | 2.61       |
| Blood               | 10              | 3.27       |
| Fatigue             | 2               | 0.65       |
| Heart               | 11              | 3.95       |
| Viral Activity      | 12              | 3.92       |
| Inflammation        | 8               | 2.61       |
| Rheumatism          | 10              | 3.27       |
| Species name                                      | Cough | Pneumonia | Breath/ Asthma | Pain/ Aches | Fever | Diarrhoea | Immune system boosters | Blood | Fatigue | Heart | Viral | Inflammation | Rheumatism | Number of COVID-related diseases/symptoms |
|--------------------------------------------------|-------|-----------|----------------|-------------|-------|-----------|------------------------|-------|---------|-------|-------|--------------|-----------|----------------------------------------|
| Azadirachta indica A. Juss.                      | Yes (f)|           | Yes (f)        | Yes (g)     |       | Yes (f)   |                        |       |         |       |       |              |           | 6                                      |
| Azanza garckeana (F. Hoffm.) Exell & Hille.     |       |           | Yes (i)        | Yes (c)     |       |           |                        |       |         |       |       |              |           | 2                                      |
| Berberis holstii Engl.                           | Yes (b)| Yes (b)   |                |             |       |           |                        |       |         |       |       |              |           | 2                                      |
| Carica papaya L.                                 |       |           | Yes (i)        |             |       |           |                        | Yes (g)|         |       |       |              |           | 2                                      |
| Combretum microphyllum Klotzsch                  | Yes (c)| Yes (c)   | Yes (c)        |             |       |           |                        |       |         |       |       |              |           | 3                                      |
| Cyphostemma junceum (Baker) Desc. ex Wild & R.B. Dramm. |       |           |                |             |       |           |                        |       |         |       |       |              |           | 3                                      |
| Dicoma anomala Sond.                             | Yes (e)|           | Yes (e)        |             |       |           |                        |       |         |       |       |              |           | 3                                      |
| Dolichos kilimandscharicus Taub.                 |       |           |                |             |       |           |                        | Yes (e)|         |       |       |              |           | 2                                      |
| Elephantorrhiza goetzei (Harms) Harms             | Yes (e)|           | Yes (e)        |             |       |           |                        |       |         |       |       |              |           | 2                                      |
| Medicinal plant | Yes (a) | Yes (b) | Yes (c) | Yes (d) | Yes (e) | Yes (f) | Yes (g) | Yes (h) | Yes (i) | Yes (j) | Yes (k) | Yes (l) | Yes (m) | Yes (n) | Yes (o) | Yes (p) | Yes (q) | Yes (r) | Yes (s) | Yes (t) | Yes (u) | Yes (v) | Yes (w) | Yes (x) | Yes (y) | Yes (z) |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Eriospermum    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| abyssinicum    | Baker  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Flacourtia     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| indica (Burm.  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| f.) Merr.      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Hypoxis        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| villosa L.F.   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Kigelia        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| africana       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| (Lam.) Benth.  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Moringa        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| oleifera Lam.  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Macuna         |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| poggei Taub.   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Neorautanenia  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| mitis (A.     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Rich.) Verde.  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Oldfieldia     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| dactylophylla  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| (Welw. ex      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Oliv.) J.      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Léonard        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Pericopsis     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| angolensis     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| (Baker) Meeuwen|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Piliostigma    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| thoungnitii    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| (Schum.) Milne-Redh. |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Pyrenacanthis  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| kaurabassona   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Baill.         |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |

Table 4 Con...
Table 4 Cont....

| Plant Name                  | Yes (a) | Yes (c) | Yes (e) | Yes (g) | Yes (i) | Yes (o) | Yes (r) | Yes (t) | Yes (u) | Yes (v) | Yes (w) | Yes (x) |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Retama raetamifolia        |         |         |         |         |         |         |         |         |         |         |         |         |
| Euphorbia trigona          |         |         |         |         |         |         |         |         |         |         |         |         |
| Croton edgeworthii         |         |         |         |         |         |         |         |         |         |         |         |         |
| Terminalia sericea         |         |         |         |         |         |         |         |         |         |         |         |         |
| Trichilia emetica          |         |         |         |         |         |         |         |         |         |         |         |         |
| Xerodendron succulentum     |         |         |         |         |         |         |         |         |         |         |         |         |
| Zanthoxylum aethiopicum     |         |         |         |         |         |         |         |         |         |         |         |         |
| Euphorbia edgeworthii      |         |         |         |         |         |         |         |         |         |         |         |         |
| Total                      |         |         |         |         |         |         |         |         |         |         |         |         |

https://dx.doi.org/10.4314/mmj.v33i2.4
| Plant species          | Cited Uses in Ethnobotanical survey (indicated in the excel sheet) | Lab study done in Malawi on the plant | Phytochemicals available                                                                 | Mechanism studies of the plants studied                                                                 | COVID-19 related tests/Studies |
|------------------------|---------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------|
| *Azadirachta indica* A. Juss. | Cough, pain/aches, fever, blood, immunity, viral infections. | None                                 | Alkaloids, flavonoids, triterpenoids, phenolic compounds, carotenoids, steroids and ketones. | Cough, asthma, antiviral activity, antidiarrheal, anti-inflammatory, antipain, immunity response, fever. Suppression of viral replication; anti-oxidant activity; induce a cell-mediated and humoral immune response; maintaining normal immune homeostasis by upregulating type 1 response; Th1 type immune responses; antibody production against viruses; increases CD4+ cell levels; induce dendritic cell maturation; macrophage-mediated antigen presentation. | Case report, Review, Computational study. |
| *Azanza garckeana* (F.Hoffm.) Exell & Hille. | Protect from illness. | Antimalarial Activity. | Amino acids, alkaloids, ascorbic acid, carotenoids, flavonoids, glucosides, phenols, lipids, tannins and saponins. | Antibacterial antifungal, antihyperglycemic, antimalarial, anti-oxidant and iron absorption activities. | None. |
### Table 5 Cont....

| Plant Name | Compounds | Activity | Effect |
|------------|------------|----------|--------|
| C. papaya L | Flavonoids, other phenolic compounds | Antioxidant, anti-inflammatory, anti-inflammatory | Heart problems |
| C. myrsinum (Klotzsch) | Quercetin, kaempferol | Antioxidant, anti-inflammatory | None |
| *D. angolensis* | None | None | None |

**Notes:**
- The table continues with additional entries that are not fully visible in the image.
- The plant names and compounds are listed along with their corresponding activities and effects.
- The table includes notes on the location and other relevant details.

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Ref: https://dx.doi.org/10.4314/mmj.v33i2.4

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**Article Details:**
- *Malawi Medical Journal* 33 (2); 85-107 June 2021
- Title: Medicinal plants in Covid-19 disease management
- DOI: https://dx.doi.org/10.4314/mmj.v33i2.4
| **Dolichos kilmanschwaricus Taub.** | Shingles, rheumatism, newcastle disease in chicken and rheumatism. | None. | None. | None. | None. |
| **Elephantorrhiza goetzii (Harms) Harms** | Pain/aches, Diaphore. | None. | Phenolic compounds, coumarins, flavonoids, saponins, stilbenoids, tannins and triterpenoids. | Antibacterial, antifungal, antiviral, anthelmintic, antioxidant. | None. |
| **Erigeron pulchellus** | Heart, Inflammation. | None. | None | None. | None. |
| **Flavocitra indica** (Burn. f.) Merr. | Pain/aches, Viral infections. | None. | Flavonoids Saponins Tannins Terpenoids Phenols Alkaloids Steroids Phlobatannins Anthroquinones Cardiac glycosides Coumerins Reducing sugars. | Antimicrobial, antiviral, antifungal properties, anti-oxidant, anti-inflammatory. | None. |
| **Hypoxis villosa** L.f. | Pain/aches, Immunity, Viral infections. | None. | None. | None. | None. |
| Medicinal plant | Common name | Parts used | Chemical constituents | Medical actions | Other actions |
|----------------|-------------|------------|-----------------------|----------------|--------------|
| *Kigelia africana* (Lam.) Beeth. | | | | | |
| | | | Pain/aches, Heart. | Iridoids, flavonoids, kigelinone, isopinnutal, dehydro-6-lapachol, p-coumaric acid, kigelinone, isopinnutal, iridoids, ferulic acid, palmitic acid and verminoside. | Antiprotozoal, antibacterial, antifungal, analgesic, anti-inflammatory, antidiarrhoea, anti-diabetic, antiproteolitic, anti-ulcer. |
| *Moringa oleifera* Lam. | | | | | |
| | | | Pain/aches, Immunity, Heart, Inflammation. | Alkaloids (moringine and moringinine), pterygospermin, triterpenoids, saponins and tannins. | Anesthetic, antinoiciceptive, antispassmodic, diuretic, anti-ulcerative, anti-ulcer, hypotensive, cardioprotective, antihelminitic, hypolipidemic, anti-atherosclerotic, hepatoprotective, wound healing, antifungal, antibacterial, antityranosomal, hypoglycemic, and anti-AIDS outcomes. |
| *Mucuna pugens* Taub. | | | | | |
| | | | Cough, Heart. Breathe/asthma. | Balsams, tannins, triterpenoids, saponins, alkaloids, terpenoids, carbohydrates. | Anti-inflammatory and anticancer properties. |
| *Neorautanenia mitis* (A. Rich.) Verde. | | | | | |
| | | | Pain. | Saponin glycosides, flavonoids, tannins and alkaloids. | Acracidal and insecticidal activities, cytoxicity, antimicrobial and antinoiciceptive activities, anti- diarrhoeal. |
| *Oldfieldia dactylophylla* (Welw. ex Oliv.) J. Léonard | | | | | |
| | | | Pneumonia, coughing, pain. | None. | None. |
| *Pericopsis angolensis* (Baker) Meeuwen | | | | | |
| | | | Breathe/asthma. | None. | None. |
| Plant Name | Conditions | Constituents | Antimicrobial Activities | Antiviral Activities | Source |
|------------|------------|--------------|--------------------------|---------------------|--------|
| *Pilostigma thonningii* (Schum.) Nalne-Redh. | Nose bleeds, fever, respiratory ailments, Malaria. | Flavonoids, tannins, kaurane diterpenes, alkaloids, carbohydrates, saponins, terpenes, and volatile oils. | Antilipidemic, antibacterial antihelminthic, anti-inflammatory, anthelmintic, analgesic, antipyretic, antidiabetic, anti-oxidant and antilipidemic activities. | None. | |
| *Pyrenacantha kaurenassana* Baill. | Breathe/asthma, Fever, Heart, Rheumatism. | Xanthose. | Anti-HIV. | None. | |
| *Sclerocarya birrea* (A. Rich.) Hochst. | None. | Polyphenols, tannins, coumarins, flavonoids, triterpenoids, phytosterols. | Antidiarrhoeal, antidiabetic, anti-inflammatory, antimicrobial, antiplasmodial, antihypertensive, anticonvulsant, antinociceptive and anti-oxidant, astringent, antihyperglycemic, anti-atherogenic, antiviral. | None. | |
| *Tabernaemontana elegans* Stapf | Backache and rheumatism. | Alkaloids. | Antibacterial activity. | None. | |
| *Taccia leucompetaloides* (L.) Kuntze | Yellow fever, stomachache, rheumatism. | Flavonoids, steroids, and tannins, taccalonolide, flavones, isoflavones, anthocyanins, coumarins, catechins, and carotenoids. | Anticancer, anti-oxidant. | None. |
| **Teprosia vogelii Hook. f.** | Viral, Inflammation. | None. | Rotenoids, flavones, flavonones, tephroin, rotenone, dequalin, terpenoids, flavonoids, tannins, saponins, and phlobatannins.\(^{113,114}\) | Anti-oxidant, antimicrobial, antiviral, and anticancer.\(^{114}\) | None. |
| **Terminalia sericea** Burc. ex DC. | Breathe/asthma, Pain/aches. | None. | Saponins, lignin, steroids, glycosides, phenolic acids, amino acids, terpenoids, tannins, flavonoids, lignans, phenols and glycosides and anthraquinones.\(^{44,115,116,117}\) | Antibacterial, anti-HIV, antifungal, lipolytic activity, anti-inflammatory activity, hypoglycemic activity, anti-mutagenic activity, acetyl-cholinesterase effect, antioxidant activity, wound healing, anticancer, anti-neurodegenerative, anti-parasitic activity, antidiabetic.\(^{44,115,116,117}\) | None. |
| **Trichilia emetica Vahl** | Pneumonia, Pain/aches, Blood. | None. | Total phenolics, total tannins, total flavonoids, total flavonoids and sterols/terpenes.\(^{118}\) | Anti-inflammatory, antischistosomal, antiparasomal, anticonvulsant, antitypanosomal, antitussive, antimutagenic and hepatoprotective properties, antioxidant, antidiarrheal.\(^{118,119}\) | None. |
| **Xeroderris stuhlmannii (Taub.) Mendonça & Sousa** | Continuous menstruation. | None. | None. | None. | None. |
| **Zanthoxylum afra (Radlk.) Exell** | Painkiller, headache. | None. | Anthocyanins, coumarins, saponins, steroids, triterpenoids, tannins and volatile oils.\(^{120}\) | Anti-atherogenic, anti-oxidative, anti-inflammatory, anticancer properties, antibacterial, antifungal, antiviral, antidiabetic, insecticidal, antitypanosomal.\(^{120}\) | None. |
| *Zingiber officinale* | Immunity, Heart. | None. | [4]-gingerol, [6]-gingerol, [8]-gingerol, [10]-gingerol, [6]-paradol, [14]-shogaol, [6]-shogaol, 1-dehydro-[10]-gingerdione, [10]-gingerdione, hexahydrocurcumin, tetrahydrocurcumin, gengerone A, 1,7-bis-(4’ hydroxy-3’ methoxyphenyl)-5-methoxyheptan-3-one, and methoxy-[10]-gingerol.121-123 | Antioxidant, anti-inflammatory, anti-nausea, anticarcinogenic, cardiovascular, cardiovascular effects, antidiabetic, anti-asthmatic, antiviral.121-123 | None. |

Table 5 Cont...