

Herbal Potential In Indonesia For Adjuvant Therapy To Corona Virus-19 Disease

Dewi Wulantresna¹, Ade Zuhrotun², Anis Yohana Chaerunisa³

¹Master of Pharmaceutical Sciences,

²Biological Pharmacy Department,

³Pharmaceutic and Pharmaceutical Technology Department, Faculty of Pharmacy,
Universitas Padjadjaran, West Java, Indonesia

¹dewiwulantresna@gmail.com,²ade.zuhrotun@unpad.ac.id,³anis.yohana.chaerunisa@unpad.ac.id

Abstract: From December 2019 until December 11, 2020, SARS-Cov-2 has cause 1,576,516 deaths to start in Wuhan, China, to 220 countries worldwide. In most people who have good immunity, the disease's symptoms disease is mild. However, in people with comorbidities and older people, it can develop into pneumonia, acute respiratory distress syndrome (ARDS), and many organ disorders. This review aims to reveal the herbal plants that potentials are dealing with and complementary therapy because no specific drug exists for the Covid -19. Based on kinds of literature showed that some herbs that have antiviral activity are the potential to be anti-SARS-Cov-2 diseases (Covid-19), especially curcumin that exists in 6,34% of traditional medicine formulas in Indonesia. Herbal products Stimuno® (Phyllanthus niruri herb extract), New Divens®(Phyllanthus niruri herb extract, Nigella sativa cement extract), Vipalbumin Plus® (Ophiocephalus striatus extract), and Lianhua Qingwen®(a combination of 13 herbs) that clinically proven to Helps improve the immune system. The National Agency of Drug and Food Control (NA-DFC) recently assisting 13 herbal drug research studies for covid-19 agents as an acceleration process to obtain distribution permits. This is way herbal medicine can be a complementary preventive and adjuvant therapy for COVID-19. However, this hypothesis requires experimental validation on the infection model of SARS-Cov-2 and COVID-19 patients. Many research further still need to find a specific cure for the disease by herbs, vaccines, or antivirals. Even though the number of Covid patients continues to increase in Indonesia and worldwide, but we always have any hope.

Keywords:Adjuvant therapy, curcumin, herbal products, Phyllanthus niruri, SARS-Cov-2

1. INTRODUCTION

Since the end of 2019, starting from Wuhan China, the world was the emergence a new disease caused by a Coronavirus that names by the World Health Organization (WHO) as SARS-Cov-2 and Covid-19 for the disease resulting in the current global health crisis [1]. The Coronavirus can cause minor disturbances to the respiratory system, severe lung infections, and death. This SARS-Cov-2 is a new type of Coronavirus that is transmitted to humans. Covid-19 has several differences from Severe Acute Respiratory Syndrome (SARS) and Middle-East Respiratory Syndrome (MERS), including in terms of the speed of spread and the severity of symptoms [2].

Until December 11, 2020, Covid-19 has spread to 220 countries, confirmed 69,143,017 cases and 1,576,516 deaths. While in Indonesia, 605,243 cases with the number

of deaths 17,740 (3.08%) above the world average (2.30%), figure cure reached 474,771 (82.45%) is above the world recovery rate (69.17%), and the number of active cases was 83,825 (14.56%) which is below the average world (28.53%) [3].

Early symptoms of Coronavirus infection appear fever, dry cough, and fatigue. Other symptoms that are less common include loss of taste or smell, nasal congestion, red eyes, sore throat, headache, muscle or joint pain, different types of skin rash, nausea or vomiting, diarrhea, and chills or dizziness [4]. The mechanism of transmission of the disease is through inhalation or direct contact with infected droplets with an incubation period ranging from 2 to 14 days. In most people who have good immunity, this symptoms disease is mild, but in people with comorbidities and older people, it can develop into pneumonia, acute respiratory distress syndrome (ARDS), and failure of many organs [5].

Literatures data showed that specific diets or herbals have an antiviral activity that can act as remedies against influenza viruses, SARS-CoV-1, and SARS-CoV-2. This fact encourages herbal medicine as a complementary therapy to prevent or cure Covid-19 diseases, especially today that there is currently no effective drug and or vaccine against COVID-19 / SARS-COV-2. Several physicians and researchers have tried using herbal medicines in clinical trials against SARS-CoV-2, including antiviral treatment (76%), antibiotic treatment (71%), oxygen therapy (75%), and intravenous immunoglobulin therapy (27%). There is also no effective pharmacological treatment against COVID-19. With the announcement of Covid-19 entering Indonesia on March 2, 2020, people began to seek health efforts by utilizing traditional medicines. This review aims to reveal the herbal plants that potentials are dealing with and complementary therapy for the Covid -19 [6, 7].

2. METHOD

In this review, the authors search and collect data related to Covid-19, herbs, and herbal therapies from the search engine Google Scholar, PubMed, SciFinder, Science Direct, Pubmed NCBI, and official website government. The keywords include Coronavirus, etiology, symptoms, allopathic therapy, guidelines therapy, immunomodulatory activity, antiviral activity, influenza, SARS-CoV-1, and SARS-CoV-2. Selected articles are reviewed and interpreted by the authors regarding using herbals as a complementary treatment and therapy against Covid-19.

3. RESULTS AND DISCUSSION

The Covid-19 disease is the third most potent type after previously appearing SARS and MERS that have emerged in the last two decades [8]. Scientists from various countries have carried out many studies to find specific vaccines and potential antiviral agents against Covid-19. This process takes a long time to many years, so other alternative treatments are needed before a specific drug is found.

Treatment with various products made from natural ingredients was carried out during the SARS outbreak that emerged in 2003. It is known that the COVID-19 gene sequence shows high similarities to SARS or MERS. Based on this identification, it is important as a rationale for finding drugs from natural ingredients that can be used for the treatment of COVID-19[9]. Covid-19 spreads faster than SARS, closer to the common cold virus. Apart from being easy to transmit, the symptoms are generally mild, and virus carriers are usually unaware that they have become a spreading agent, so the number of people with COVID-19 is likely to be far more than the positive cases recorded. The rate at which an epidemic or the spread of disease can be influenced by two things: How many people can a carrier be infected (reproduction number) and how quickly the infection passes from one person to another

(serial interval) in a chain of transmission. COVID-19 has a short serial interval like the common cold and rapidly spreads, requiring high alertness to control the transmission. The high asymptomatic transmission in China, more than 10 percent of Covid-19 infections, came from sufferers who had not experienced symptoms and needed a special approach to contain the spread of COVID-19. The difference between COVID-19 and other viruses can be seen in Table 1 [10].

Table 1: Symptoms Differences Between COVID-19 and Other Viruses [4, 10]

Diseases	Spread	Symptoms
Measles virus	Airborne	The initial symptoms of measles appear 3-5 days before the appearance of the rash. These symptoms are not typical and are similar to flu symptoms, namely: fever, fatigue, aches, colds, nasal congestion, dry cough, diarrhea, vomiting, loss of appetite, red, watery, and sensitive to light, swollen and appearing eyelids white patches inside the mouth
smallpox	droplet, sneezing, and cough	High fever Head and body pain Sometimes vomiting
Polio virus	Fecal oral route	Fever, Headache, Sore throat, Vomiting, Muscle weakness, Stiffness in the neck and back, pain and numbness in the arms or legs, Loss of body reflexes, painful muscle tension, and weakness in the leg or arm
Rubella virus	droplet, sneezing, and cough	Red rash that starts on the face then spreads to the body and legs, fever, headaches, colds, nasal congestion, lack of appetite, red eyes, joint Pain, especially in young women, a lump appears around the ears and neck, due to swollen glands lymph.
Mumps rubella virus	droplet, sneezing, and cough	Swollen cheeks can be only one side or both sides due to swelling of the parotid glands, fever, Pain when chewing or swallowing food, dry mouth, headache, joint Pain, abdominal Pain, Loss of appetite
Bardetella partusis	droplet, sneezing, and cough	mild cough, sneezing, runny or stuffy nose, red and watery eyes, or low-grade fever, the face looks red or purplish when coughing, a "whoop" sound appears when you take a long breath before coughing, Vomiting after coughing, Feeling very tired after coughing, difficulty catching your breath
Humene immune-deficiency virus (HIV/AIDS)	Body fluids	HIV: Weight loss, night sweats, Fever, Diarrhea, Nausea and vomiting, Herpes zoster, Swollen lymph nodes, Headaches, Body feeling weak. AIDS includes Weight loss without a known cause, Night sweats, White patches on the tongue, mouth, genitals, and anus, Purple spots on the skin that don't go away. Symptompms may indicate Kaposi's sarcoma, fever that lasts more

Diseases	Spread	Symptoms
		than ten days, chronic diarrhea, nervous disorders, such as difficulty concentrating or memory loss, yeast infection in the mouth, throat or vagina, easy bruising or bleeding without cause, irritability and irritability. depression, rash or spots on the skin, shortness of breath, and the body always feels weak
SARS	Saliva droplet, sneezing, and cough	fever, cough, back pain, nasal congestion, weakness, headache, and muscle aches. If it gets worse, the symptoms of all three can resemble pneumonia, namely fever, severe cough, difficulty breathing, and rapid breathing
COVID-19	Saliva droplet, sneezing, and cough	fever, cough, back pain, nasal congestion, weakness, headache, and muscle aches. If it gets worse, the symptoms of all three can resemble pneumonia, namely fever, severe coughing, difficulty breathing, and fast breathing, and rarely accompanied by colds and digestive complaints, such as loose stools (diarrhea), nausea, and vomiting.
Influenza	Saliva droplet, sneezing and cough	fever, runny nose, stuffy nose, and headache. Although the same as the symptoms of a common cold cough, flu symptoms are more severe and often strike suddenly.
Aavian influenza (H5N1, H5N6, H5N8, dan H7N9)	Touching infected poultry, whether alive or dead Touching feces, saliva, and mucus from infected poultry Inhalation of respiratory droplets containing the virus Eating raw, undercooked meat or eggs of infected poultry	Fever, Cough, Sore throat, Muscle aches, Headache, Fatigue, Runny or stuffy nose, Shortness of breath. Other symptoms can also include vomiting, abdominal Pain, diarrhea, bleeding gums, nosebleeds, chest pain, and red eyes (conjunctivitis). In severe infections, bird flu can even cause pneumonia, acute respiratory distress syndrome (ARDS), respiratory failure, seizures, and nervous system disorders.
Ebola virus	Body fluids	These symptoms include: Fever, Headache, Sore throat, Vomiting, Muscle weakness, Stiffness in the neck and back, Pain and numbness in the arms or legs, Loss of body reflexes, muscle tension that feels painful, and limbs or arms felt weak
MERS-CoV2	Saliva droplet, sneezing, and cough	fever, cough, Tangerang pain, nasal congestion, weakness, headache, and muscle aches. If it gets worse, the symptoms of all three can resemble pneumonia, namely fever, severe cough, difficulty breathing and rapid breathing

There is no specific antiviral drug recommended for COVID-19 patients in Indonesia [11]. For emergency purposes, the National Agency of Drug and Food Control (NA-DFC) was allowed to use chloroquine and hydroxychloroquine beside other antiviral drugs. But at the end of October 2020, NA-DFC received a safety report on the use of hydroxychloroquine and chloroquine from the results of a 4-month observational study in 7 (seven) hospitals in Indonesia. The report showed that out of 213 cases receiving hydroxychloroquine or chloroquine, 28.2% had a heart rhythm disturbance in the form of a prolonged QT interval[12].

Table 2. Management Protocol of Pharmacology For COVID-19 Patients [13]

Drugs therapy	Patients symptoms			
	no	Mild	medium	severe
Vitamin: a) C Non-acidic 500 mg/6-8 hours, oral (14 days) b) C Lozenges 500 mg/12 hours, oral (30 days) c) Multivitamin C, B, E, and Zink 1-2 tablet/day, oral (30 days)	√	√	√	√ (i.v)
Antimicrobial: a) Azithromycin 500 mg/day, oral ora i.v (5 days), or b) Levofloxacin 750 mg mg/day, oral ora i.v (5 days)	-	√	√	√
Antiviral: a) Oseltamivir 75 mg/12 hours, oral (5-7 days) b) Lopinavir+Ritonavir 400/100 mg/12 hours (10 days) c) Favipiravir 600 mg/12 hours, oral (5 days) or loading dose 1600 mg/12 hours, oral (day 1) and continue 600 mg/12 hours, oral (day 2-5) d) Remdesivir 200 mg/3 hours, i.v drip loading dose, and continue 100 mg/3 hours, i.v drip (9-13 days) e) Chloroquine phosphate 500 mg/12 hours, oral (5-7 days) f) Hydroxychloroquine 400 mg/24 hours, oral (5-7 days)	-	√ One of: (a), (b), (c), (e), (f)	√ One of: (a),(b),(c) with loading dose, (d) Added (e) or (f)	√ One of: (a),(b),(c) with loading dose, (d) Added (e) or (f)
Additional: a) Paracetamol or ibuprofen if any fever b) Herbal drugs and antioxidant	√	√	√ Add: Enoxaparin (anticoagulants)	√ Add: Enoxaparin (anticoagulants), Dexamethasone (Corticosteroids), Ventilator

As seen in Table 2, some drugs of choice are included in Guidelines (version 6) for treatment of COVID-19 in China, the country where the major Covid-19 cases [14]. Another way to overcome this global pandemic can be done with vaccination and developing herbal drugs by local wisdom or ethnomedicine.

Regarding vaccination, the Ministry of Health Republic of Indonesia has determined six types of vaccines produced by PT. Biofarma (Persero), AstraZeneca, China National Pharmaceutical Group Corporation (Sinopharm), Moderna, Pfizer inc. and BioNTech, and Sinovac Biotech Ltd. are permitted to be used in Indonesia. All vaccines are still in the clinical trial stage [15]. In December 2020, some vaccine was imported, but the implementation is still waiting for distribution permits and the evaluation process from NA-DFC.

Herbs have become an important cultural heritage from Indonesia, as the consumption of herbs in 2010 showed 50% of the population and 96% of them feels the benefit of Jamu. Jamu is herb in Indonesian traditional medicine. Since 2015, peoples were encouraged officially by the government programs GERMAS (Healthy peoples movement) and BUDE JAMU (stay fit and healthy by consuming Jamu). The local government also has a strategic role in managing herbs through policy innovation for the local community's health service. Research data in 2016 showed that the use of Jamu as an alternative to modern medicine in the lower-middle-class group was relatively high (58 %) [16, 17]. The NA-DFC is recently assisting 13 herbal drug research studies for covid-19 agents as an acceleration process to obtain distribution permits. The list is shown in Table 3.

Table 3. Under Research Product As A Candidate For Anti-Covid-19 In Indonesia [18]

No	Product name	Research Team	Location	Claim	Status
1	Imunocov (H2 Health and Happiness Cordyceps Militaris dan Fatigon Promuno)	Indonesian Institute of Sciences, Association of Doctors for Developing Traditional Medicine and Jamu Indonesia (PDPOTJI)	Emergency Hospital for Covid-19 (Athletes Guest house)	Immunomodulator	The evaluation process, Clinical trial finished.
2	Avimac	PT. Neumedik	Persahabatan Hospital and Athletes Guesthouse	Immunomodulator	Under Clinical trial
3	Health Tone Oil	PT. RHEA	Hasan Sadikin Hospital and Athletes Guesthouse	Immunomodulator	Approval of Clinical Trials
			Persahabatan Hospital	Prophylaxis for health personnel	preparing a clinical trial protocol
4	Be neficio (Virgin Coconut Oil)	The Secretariat General National Resilience Council	Bhayangkara 1 st Police Hospital R.Said Sukanto	Immunomodulator	preparing a clinical trial protocol

No	Product name	Research Team	Location	Claim	Status
		Republic of Indonesia and Bhayangkara Police Hospital			
5	Euca (Essential oils of Eucalyptus leaves)	Ministry of Agriculture and PT. Eagle Indo Pharma	Hasanudin University Hospital	Improvement of clinical symptoms	preparing a clinical trial protocol
6	Innamed COV (OB Herbal, Soman 2, Imugard)	The Indonesian Pharmacist Association	Emergency Hospital for Covid-19 (Athletes Guest house)	Immunomodulator	preparing a clinical trial protocol
7	Herbamuno+	PT. Mustika Ratu, Clinical Research Supporting Unit (CRSU) and Faculty of Medicine University of Indonesia	Emergency Hospital for Covid-19 (Athletes Guest house)	Immunomodulator	preparing a clinical trial protocol
8	Vipalbumin	PT. Royal Medicalink Pharmalab	Persahabatan Hospital	Improvement of clinical symptoms	preparing a clinical trial protocol
9	Bejo	PT. Bintang Toedjoe, Indonesian Institute of Sciences	Pertamina Hospital, General and worker Hospitals	Immunomodulator	preparing a clinical trial protocol
10	Extract of <i>Psidium guajava</i> leaves	National Agency for research and Innovation, Bogor Institute of Agricultural and PT. SOHO	pre-clinical trial	Anti-inflammation	preparing a pre-clinical trial protocol
11	Extract of <i>Cassia alata</i> and extract of <i>Dendrophthoe pentandra</i> (L.) Miq	Indonesian Institute of Sciences	pre-clinical trial	Anti-Covid 19	preparing a pre-clinical trial protocol
12	Galobe and Pangiar	PT. Halmahera Mandiri Sejati Indonesia and STIKMAH	pre-clinical trial	Anti-Covid 19	preparing a pre-clinical trial

No	Product name	Research Team	Location	Claim	Status
		Halmahera Utara			protocol
13	Extract of <i>Ficus septica</i> leaves	PT. Konimex	pre-clinical trial	Antipyretic, Anti-inflammation	preparing a pre-clinical trial protocol

An investigation of Lianhua Qingwen [19], a Traditional Chinese Medicine formula consisting of a combination of 13 herbs (Table 4). This medicine already sold in Indonesia with a permit since June 13, 2019, imported by PT. Intra Aries. According to literature, Chinese Mahogany, Chinese licorice root, red spider lily, Scythian sheep rhizome, and their extracts or compounds have reported anti-SARS-CoV-1 activity in Vero cells with a SARS-CoV-1 infection model. Although there are several natural products such as baicalein that have been shown to be proven inhibitors of SARS-CoV-2, no studies have yet been published on a single ingredient, its extract, and its bioactive compounds against SARS-CoV-2 [1]. Therefore, studying the effects of certain bioactive compounds on SAR-CoV-2 requires laboratories that are very high in inward airflow (biosafety level 3; BSL-3) and is a challenge for most researchers.

Table 4. Some herbs in Indonesia with antiviral activity [1,12,19]

No	Herbs	materials	Experimental mode	Action Mode
1	<i>Allium sativum</i> (Alliaceae)	Garlic aqueous extract	H9N2 virus infection in MDCK cells and chicken embryo	Anti-avian influenza virus H9N2 activity in both chick embryos and cell models
		Garlic extract	H1N1 virus infection in MDCK cells	Inhibits H1N1 virus penetration and proliferation in cell culture
2	<i>Zingiber Officinalis</i> (Zingiberaceae)	Ginger aqueous extract	H9N2 virus infection in MDCK cells and chicken embryo	Anti-avian influenza virus H9N2 activity in both chick embryos and cell models
3	<i>Curcuma longa</i> L. (Zingiberaceae)	Aqueous extract	hepatitis B virus (HBV)	Suppression of HBV replication by increasing the p53 level
		Curcumin, reduced curcumin, allyl-curcumin, tocopheryl-curcumin	human immunodeficiency virus (HIV) model	Inhibition of Tat-mediated transactivation of HIV-1 Viral long terminal repeat (LTR)
		Curcumin, curcumin boron complexes	HIV model	Inhibition of HIV-1 and HIV-2 proteases
		Curcumin	HIV model	Inhibition of HIV-1 LTR-directed gene expression, Inhibition of HIV-1 Integrase, Inhibition of Tat protein acetylation, but no

No	Herbs	materials	Experimental mode	Action Mode
				antiviral effect in a clinical trial
		Curcumin, gallium-curcumin, Curcumin	herpes simplex virus (HSV-1)	Reduction of HSV-1 replication
		Curcumin	HSV-2	Significant protection in a mouse model
			Influenza virus, H1N1 and H6N1 subtypes	Inhibition of haemagglutination
		Curcumin	hepatitis C virus (HCV)	Decrease of HCV replication by suppressing the Akt-SREBP-1 pathway
		Curcumin	High-risk human papillomaviruses (HPVs)	Inhibition expression of viral oncoproteins of E6 and E7, and Downregulation effect on the transcription of HPV-18
		Curcumin	Japanese encephalitis virus (JEV), endemic arbovirus in Southeast Asia	Reduction in production of infective viral particles
		Curcumin	human T-cell leukemia virus type 1	Downregulation of JunD protein in HTLV-1-infected T-cell lines
4	<i>Eucalyptus polybractea</i> , <i>Eucalyptus globulus</i> (Myrtaceae)	Aerosol and vapor of eucalyptus oil	H11N9 virus infection in MDCK cells	Inhibits the avian influenza H11N9 virus in the form of aerosols and vapors form
		Eucalyptus oil	H11N9 virus infection in MDCK cells	Pre-coated eucalyptus oil inactivates captured H11N9 virus in fiber material
5	<i>Melaleuca alternifolia</i> (Myrtaceae)	Aerosol and vapor of melaleuca oils	H11N9 virus infection in MDCK cells	Inhibits the avian influenza H11N9 virus in the form of aerosols and vapors form
		melaleuca oils	H11N9 virus infection in MDCK cells	Pre-coated tea tree oil inactivates captured H11N9 fiber material
6	Stimuno (PT Dextra Medica)	<i>Phyllanthus niruri</i> herb extract	Clinically proven, registered: Capsule FF172600731, Capsule forte FF152300641, syrup FF172600721E,	Helps improve the immune system (immune system), helps stimulate the body to produce more antibodies and activate the immune system so that the immune system works optimally

No	Herbs	materials	Experimental mode	Action Mode
			berry flavor syrup FF172600721, grape flavor syrup FF152600651	
7	New Divens, (PT Ferron Par Pharmaceutica ls)	<i>Phyllanthus niruri</i> herb extract, <i>Nigella sativa</i> cement extract	Clinically proven, registered: Capsule FF172300711, berry flavor syrup FF172600741	To help improve endurance and maintain health
8	Vipalbumin Plus (PT Royal Medicalink Pharmalab)	<i>Ophiocephalus striatus</i> extract	Clinically proven, registered: Sachet FF182200771	increase endurance, albumin and hemoglobin levels, accelerate postoperative wound healing, eliminate edema, accelerate the healing process of disease, as additional nutrition for the elderly, pregnant women, children
9	Lianhua Qingwen	Composition: <i>Forsythia suspensa</i> (Thunb.) Vahl, <i>Ephedra sinica</i> Stapf, <i>Lonicera japonica</i> Thunb. <i>Isatis indigotica</i> Fortune, <i>Mentha haplocalyx</i> Briq., <i>Dryopteris crassirhizoma</i> Nakai, <i>Rhodiola rosea</i> L., <i>Gypsum fibrosum</i> , <i>Pogostemon cablin</i> (Blanco) Benth., <i>Rheum palmatum</i> L., <i>Houttuynia cordata</i> Thunb., <i>Glycyrrhiza uralensis</i> Fisch., and <i>Armeniaca sibirica</i> (L.) Lam.	in vitro cytotoxicity and antiviral test using Madin-Darby canine kidney (MDCK) cells and A549 cells, a human alveolar type II-like epithelial cell line registered capsule TI144348471	broad-spectrum effects on a series of influenza viruses, including the newly emerged H7N9, and particularly regulates the immune response of virus infection indication: Helps relieve symptoms of influenza, such as heartburn, fever, joint pain/aches, congestion and runny nose, headaches, cough, and dry throat.

The total number of Indonesian medicinal plant species used in 32,013 traditional medicine formulas was 2,848. Among 2,354 respondents used eight species of the genus *Curcuma* as ingredients (6.34% of the formulas identified) for many diseases. The most frequently used is *Curcuma longa* L., followed by *Curcuma zanthorrhiza* Roxb., *Curcuma*

zedoaria (Christm.) Roscoe, *Curcuma aeruginosa* Roxb., *Curcuma* sp., *Curcuma manga* Valetton & Zijp, *Curcuma heyneana* Valetton & Zijp, *Curcuma rubescens* Roxb., and, *Curcuma caesia* Roxb [21]. Almost all these plants contain curcuminoid, which can be seen in Table 4, with a potential and wide range of antiviral activity. From Tables 3 and 4, we know that there is a chance to get anti-covid-19 from natural ingredients, but it will take time and money to research further.

Even though the number of Covid patients continues to increase in Indonesia and worldwide, we must still have hope of total patient recovery. It needs cooperation from researchers, the government, the pharmaceutical industry, and society so that this pandemic will end soon.

4. CONCLUSION

Based on kinds of literature, some herbs that have antiviral activity can be anti-SARS-Cov-2 diseases (Covid-19), especially curcumin that exist in 6,34% of traditional medicine formulas in Indonesia. Herbal products Stimuno® (*Phyllanthus niruri* herb extract), New Divens® (*Phyllanthus niruri* herb extract, *Nigella sativa* cement extract), Vipalbumin Plus® (*Ophiocephalus striatus* extract), and Lianhua Qingwen® (combination of 13 herbs) that clinically proven to Helps improve the immune system. The National Agency of Drug and Food Control (NA-DFC) recently assisting 13 herbal drug research studies for covid-19 agents as an acceleration process to obtain distribution permits. That way, herbal medicine can be a complementary preventive and adjuvant therapy for COVID-19. However, this hypothesis requires experimental validation on the infection model of SARS-Cov-2 and COVID-19 patients.

5. REFERENCES

- [1] S. Panyod, C. T. Ho, and L. Y. Sheen, "Dietary therapy and herbal medicine for COVID-19 prevention: A review and perspective," *Journal of Traditional and Complementary Medicine*. 2020, doi: 10.1016/j.jtcme.2020.05.004.
- [2] World Health Organization, "Naming the coronavirus disease (COVID-19) and the virus that causes it," 2020.
- [3] Satuan Tugas Penanganan Covid-19, "Analisis Data COVID-19 Indonesia: Update Per 06 September 2020," 2020.
- [4] WHO, "Q&A on coronaviruses (COVID-19)," *Who*, 2020. .
- [5] S. T., "A Review of Coronavirus Disease-2019 (COVID-19)," *Indian J. Pediatr.*, 2020.
- [6] C. N. *et al.*, "Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study," *Lancet*, 2020.
- [7] CDC, "Information for Clinicians on Investigational Therapeutics for Patients with COVID-19," *Public Heal. Media Libr.*, 2020.
- [8] G. Kampf, D. Todt, S. Pfaender, and E. Steinmann, "Corrigendum to 'Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents' [J Hosp Infect 104 (2020) 246–251]," *J. Hosp. Infect.*, 2020, doi: 10.1016/j.jhin.2020.06.001.
- [9] L. Zhang and Y. Liu, "Potential interventions for novel coronavirus in China: A systematic review," *Journal of Medical Virology*. 2020, doi: 10.1002/jmv.25707.
- [10] N. F. E. Pariang, E. Wijaya, P. Sarnianto, Z. Ikawati, I. Puspitasari, and L. Noviani, "Panduan Praktis Untuk Apoteker Menghadapi Pandemi COVID-19," *Pengurus Pus. Ikat. Apot. Indones.*, 2020.
- [11] Kemenkes RI, "Pedoman Pencegahan dan Pengendalian Coronavirus Disease (COVID-19)," *Germas*, 2020.

- [12] BPOM, “PENJELASAN BADAN POM RI Tentang Klaim Produk Herbal yang Dapat Menyembuhkan Pasien COVID-19,” *Bpom*, 2020. .
- [13] Tim COVID-19 Indonesia, “Protokol Tatalaksana Covid-19,” *1*, 2020.
- [14] L. Dong, S. Hu, and J. Gao, “Discovering drugs to treat coronavirus disease 2019 (COVID-19),” *Drug Discov. Ther.*, 2020, doi: 10.5582/ddt.2020.01012.
- [15] 2020 Kementerian Kesehatan RI, “Corona virus disease 2019,” *Peratur. Menteri Kesehat. Republik Indones.*, 2020.
- [16] A. Andriati and R. M. T. Wahjudi, “Tingkat penerimaan penggunaan jamu sebagai alternatif penggunaan obat modern pada masyarakat ekonomi rendah-menengah dan atas,” *Masyarakat, Kebud. dan Polit.*, 2016, doi: 10.20473/mkp.v29i32016.133-145.
- [17] Kemenkes RI, *Riset Kesehatan Dasar 2010*. 2010.
- [18] B. P. O. dan M. R. Indonesia, “Informatorium Obat Covid-19 di Indonesia,” in *BPOM RI*, 2020.
- [19] Y. Ding *et al.*, “The Chinese prescription lianhuaqingwen capsule exerts anti-influenza activity through the inhibition of viral propagation and impacts immune function,” *BMC Complement. Altern. Med.*, 2017, doi: 10.1186/s12906-017-1585-7.
- [20] BPOM RI, *Pedoman Teknologi Formulasi Sediaan Berbasis Ekstrak*. 2012.
- [21] D. Subositi and S. Wahyono, “Study of the genus curcuma in Indonesia used as traditional herbal medicines,” *Biodiversitas*, 2019, doi: 10.13057/biodiv/d200527.