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The importance of herbal plants (*Aloe vera* L.) in immune system support anti-COVID -19: A review article

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Abstract

Fear has spread worldwide due to the emergence of a dangerous epidemic virus known as Corona and scientifically (COVID-19). The World Health Organization (WHO) has declared a state of emergency in 2020 as this virus is contagious and spreads rapidly among humans through breathing. His first appearance in China was specifically Wuhan City in December 2019. Doctors find one of the top reasons COVID-19 is so fast is weak immune response. In this period, there was no effective antiretroviral drug to prevent or treat COVID-19. The world faces a challenge and there is an urgent need for effective drugs. Opinions have abounded about eating natural herbs and linking their benefits to improved immunotherapy against COVID-19. Plants and natural compounds are a rich, proven source for new drug discovery. These tropical plants have antiviral properties and immune degradation activities and this confirms the likelihood that they will be used as a supplement to treatment to get a better life for the patient, and may be important in treating coronavirus. In this review article, the role of medicinal plants will be discussed in enhancing immunity to prevent Covid-19 and other diseases, and the review will specifically address the *Aloe vera* plant.

Keywords: ***Aloe vera* L., immune system, anti- COVID -19**.

Introduction

Corona pandemic: COVID-19 is an infectious viral disease of a new strain not previously known to humans (WHO, 2020), that causes serious and life-threatening respiratory illness, and it is a public health emergency and belongs to a large family of viruses called coronaviruses. The first case of the virus was in China. Especially, (Wuhan city), This disease is caused by the SARS-CoV2 virus, whose most likely environmental reservoirs for SARS-CoV-2 are bats. It is known to spread from animal to person and between people through respiratory droplets produced during coughing or sneezing (WHO, 2020 "Situation Report").

The period between exposure to the disease and the onset of symptoms is often about five days, and sometimes the period may range from two to fourteen days. The virus was inferred by the common symptoms of those carrying the virus: fever, coughing and shortness of breath. One of the most serious symptoms of the patient's life is respiratory damage because it causes pneumonia and acute respiratory syndrome, and kidney failure may occur and the patient dies (WHO, 2020).

The number of cases infected with the virus reached more than 60,074,174 million cases in 220 cities and regions worldwide as of November 27, 2020, and the number of deaths reached almost or more than 1,416,292 deaths. With more than 39,000,000 cases recovered (COVID-19 Dashboard, 2022), the World Health Organization (WHO) declared COVID-19 a pandemic and received the highest attention, it was added to the list of infectious diseases.

Although vaccines and vaccines are known and always used in cases of viral infection, there was no specific and robust vaccine to completely prevent the COVID-19 virus. There is no effective treatment or vaccine for Covid19, however, health care Using hydroxychloroquine, chloroquine, lopinavir, ritonavir, remdesivir, and azithromycin to treat virus-related symptoms depending on the severity of the disease as well as providing supportive care (such as oxygen therapy, giving fluids) to infected people. (CDC. COVID-19, 2020).

As of January 4, 2020 and according to the National Institute for Health Clinical Trials website, there are 3,265 clinical trials looking for a treatment for COVID-19. Perhaps the development of these treatments may require a longer period of time,

which necessitates the need to find more immediate and appropriate preventive and treatment options as soon as possible due to the rapid spread of infection (Nakamura Chen, 2004).

COVID-19 has become a difficult and uncontrollable epidemic as it cannot be contained in globally available health systems. Healthcare financing, health infrastructures and the impact of COVID-19 on societies is detrimental to the very existence of humanity. The situation required the mobilization of all resources, including traditional medicine. On a global scale, the use of traditional medicines continued to expand rapidly and many people depended on natural products due to their primary health care needs (WHO, 2004).

More than 80% of the population of developing countries in the world rely on natural products as the main source of health care, as confirmed by reports of the World Health Organization. The past decade has seen a huge surge in acceptance and public interest in natural products in both developing and developed countries. Eighty-eight (88%) out of 194 WHO members advise the use of traditional and complementary medicine in their countries, where natural products are sold not only in pharmacies but also in food stores and supermarkets. (Mukherjee, 2002; Bodeker et.al., 2005; Bandaranayake, 2006).

The world was previously hit by a serious epidemic in 2003 and was known as SARS or (acute respiratory syndrome virus), and natural products, specifically herbal preparations, were used in the prevention and treatment of this outbreak. The final herbal product was able to prevent more than 1,000 study participants among some health care workers from contracting SARS (Lau et.al., 2005)

Two other studies confirmed that all participants with herbal products were front-line health workers responsible for treating SARS patients in two separate hospitals in China, yet they were not infected with the SARS virus (YANG et al., 2020). Also in 2009, more during the HINI pandemic in the People's Republic of China, herbal medicines were used to prevent HINI virus (NATCM, 2009).

Natural products are a promising and potential source for the treatment of various diseases including infectious diseases and COVID-19 and it is possible to use the proven natural products effectively on a large scale among the majority of the world population. Where certain phytochemicals are identified to help reduce infection. (Gomathi et.al., 2020).

By exploiting natural products, more innovative and alternative treatment methods can be developed for their role in overcoming the transmission of the virus (Balachandar et al., 2020). Reports indicate that China is using traditional Chinese medicine to treat COVID-19 patients, and harnessing the potential of natural products as an alternative and supplement to traditional medicines in the management of COVID-19 is a valuable resource to this end. Hubei Provincial Health Commission Chairman Wang Hesheng confirmed that treatment in Wuhan hospitals includes a combination of TCM (Traditional Chinese Medicine) and allopathic medicines that give good results.

Some reports have issued that natural products contain different types of phytochemicals that could be potential sources for enhancing immune responses, as well as stopping virus replication. Examples of these chemicals (alkaloids, flavonoids, phenolic compounds, and glycosides) (Klos et al., 2009), although there are many reports available on the use of natural products to manage some diseases, knowledge of natural products used to treat COVID-19 is limited and not well documented.

The role of medicinal plants and their protective activity against the Covid-19 virus:

Although traditional medicine has been integrated into the healthcare delivery system since 2011. However, it is not being used, as Ghana currently relies on WHO clinical guidelines for the management of Covid-19 that are based on allopathic medicine.

Ghana has established a joint cooperation between natural products experts and medicinal herbs in all research centers to work on combining traditional medicine and medicinal plants that are useful in treating some diseases and then can help in resisting covid-19, and these were the best efforts that were made in order to overcome that crisis and come up with a cure for this epidemic (Caleb, 2020).

Some ethnobotanical and pharmacological studies have been conducted on some indigenous Ghanaian medicinal plants such as; *Paullinia pinnata*, *Solanum torvum*, *Alstonia boonei*, *Acacia kamerunensis*, *Aleo vera* among others successfully treat a large number of viral infections such as colds, pneumonia, hepatitis and HIV in Ghana and studies have shown that these medicinal plants can prevent The virus has successfully stopped reproducing. There are many scientific data to prove that antiviral medicinal plants have detectable activity to combat COVID19, and thus medicinal plants have proven their role in treating and fighting viruses, specifically at the time

of the pandemic (Addo-Fordjour et al., 2008; Koffuor et. al., 2014).

Kwadwo Odoom Eduful, President of the Ghanaian Association of Traditional Medicinal Healers (GHAFTRAM) confirmed that as old as Ghana, the use of boiled neem tree leaves, *Ocimum viride*, and *Cymbopogon citratus* for steam inhalation has continued for decades against infectious diseases and has been shown to help calm influenza and heal Cough and fever, the main symptoms of COVID_19 virus and some of them are respiratory diseases, Mr. Eduful stated that some herbal products with immune-enhancing activities have already been registered by the Food and Drug Authority (FDA), Ghana (Eduful , 2020).

A Ghanaian nurse who was based in the USA was recently infected with Covid-19, and claimed to have used; The fruits of *Xylopia aethiopica* (Piper), *guineense*, *Alium sativum* (Garlic), lemon and *Zingiber officinale* (ginger) as a prescription for the treatment of COVID-19 have been successfully cured (Ghanaian, 2020).

It has been discovered that it is the flavonoids in medicinal plants that give them strong immunomodulatory potential (Xiao et al., 2018), hence all research institutions should cooperate together to search for potential secondary metabolites from natural products and other sources to find a preventive or treatment for COVID-19.

The idea of using these medicinal plants spread in different parts of Ghana and other countries, especially Egypt, during the outbreak of the virus. This is evidence of the circulation of medicinal plants through experimentation and information exchange. These medicinal plants play a vital role in nutrition and human health. It contains sugars, vitamins, minerals, fatty acids, amino acids, enzymes, etc. It also contains a wide range of biologically active secondary metabolites such as flavonoids, organosulfur compounds, glycosides, alkaloids, and others. This diverse group of bioactive metabolites is responsible for many biological effects such as immune-enhancing, antiviral, antibacterial, and antioxidant activities. In this review, we mentioned various examples of medicinal plants that have proven their role in preventing diseases and protecting human health, and from here we will single out a very important herbal plant in enhancing immunity, and many studies have been conducted on it to prove this, which is the *A. vera* plant.

General description of the *A. vera* plant:

Common Names: Aloe:

One of the morphological characteristics of the *A. vera* plant is its short stem and somewhat thick, so it can store large amounts of water in its leaves, and this is what enables it to withstand drought and high temperatures, it grows in subtropical regions such as (the southern border areas of Texas, New Mexico, Arizona and California), and a lot of research has been conducted to ascertain the benefits of *A. vera* and it turned out that it is used in the treatment of many diseases (skin) and it is possible to treat baldness, wound healing and burn treatment (Leech, 2020).

Morphological Description:

Herbaceous perennial plant with triangular stem, sessile, shallow root system, fleshy serrated leaves, alternate in rosettes up to 30-50 cm long and 10 cm wide at the base; Similar in color to green peas. The bright yellow tubular flowers, 25-35 cm long, the axillary spike and stamens often drop outside the peripheral tube, and the fruits contain many seeds (Yeh et al., 2003).

Active Substances:

- *A. vera* contains twenty of the 22 essential amino acids required for repair and growth.
- Enzymes - catalyze the occurrence of chemical reactions.
- antimicrobial, antihelminthic (anthelmintic, antiparasitic), Wound healing of skin tissue and sores.
- Contains 8 of the 13 recognized vitamins.
- Urea nitrogen - as a pain reliever.
- Lactate and salicylate - have analgesic properties.
- Lipids - are considered the basic structural components of living cells.
- Lectins - anti-tumor effects.

- Minerals - such as: calcium, magnesium, potassium and sodium are all present in large quantities.
- Indications Contraindications / Precautions Not recommended during pregnancy.
- Phenols - mild antiseptics and antimicrobials (Kumar et al., 2010).

The history of the origin of the *A. vera* plant:

A. vera was cultivated thousands of years ago, it was classified as a medicine in folk traditional medicine, because of its healing properties in skin diseases. Its first use was documented in an Egyptian papyrus as early as 3500 BC (Crosswhite et al., 1984).

The name *A. vera* comes from the Arabic word "Alloeh" which means "shining bitter substance" due to the presence of bitter liquid in the leaves. and the second part "Vera" which means "correct" in Latin

For the first time, Carl Linnaeus in 1753 proposed the following classification to describe this species: Kingdom: plantae, Order: Asparagus, Family: Asphodelaceae, Genus: Aloe, Species: Aloe (Gage, 1996; Surjushe et al., 2008).

A. vera is widely cultivated as an ornamental plant. There are about four main species out of 420 species that have medicinal properties, among which *A. vera* is considered the most effective and therefore the most popular. Some studies have confirmed that most *A. vera* plants are not poisonous, but a few are very poisonous (Atherton, 1998; Grindlay and Reynolds, 1986).

To infer the history of the use of *A. vera* in ancient times, we find the Greek philosopher Aristotle wrote about the beneficial medicinal effect of *A. vera*, the ancient Greeks, Romans, Chinese and Indians used it, while references are also found throughout the Bible. At the beginning of the nineteenth century, *A. vera* was known as a laxative in the United States, and recently reports were published on the successful treatment of x-rays and radium burns using *A. vera* and its modern clinical use began in the 1930s (Surjushe et al., 2008).

Health Benefits:

The results of my studies confirmed both (Reynolds and Dweck, 1999; Choi and Chung, 2003). *A. vera* acts as an immunostimulant, and (Rodriguez et al., 2010) indicated that *A. vera* has a wide range of applications in traditional medicine. While (Femenia et al., 1999) stated that the main part of it consists of *A. vera* gel, which contains 98.5 - 99.5% water (Choi and Chung, 2003), while the remaining dry matter contains biologically active substances with antibacterial, it has antiviral, anti-fungal, anti-immune, anti-tumor, anti-oxidant, anti-diabetic, and other healing properties.

Interpreted studies of both (Konjufca et al., 2004; Khan et al., 2012) The vitamin E found in *A. vera* is a fat-soluble vitamin that also has immune-stimulating effects as well as antioxidant properties.

Other uses:

A. vera has many other uses that work on the safety of human health. It is used as an anthelmintic, laxative, antiseptic, diuretic, stomachic, and emmenagogue. The juice is used in the treatment of skin diseases, burns, indigestion, menopause, colic, hyperhidrosis, hepatopathy, splenopathy, tumors, ascites, sciatica, back pain, A. vera gel is of exceptional value in ulcerative colitis and weight ulcers. Treatment of Burns of the I-II degree, Dermatitis , Psoriasis, Skin moisturizer, Oral lichen planus infections, Heart attack, Type 2 diabetes (Yagi et al., 2003).

Medicinal uses:

A. vera gel contains polysaccharides and growth hormone gibberellins, thus helping to heal wounds: The reason for the high healing ability of A. vera is the discovery of the current number of mucopolysaccharides (MPS) between 10,000-20000 megabytes per liter 8. Its ability to form collagen and elastin continuously leads to a reduction Wrinkles (Talmadge et al., 2004; Feily, and Namazi, 2009). We

add to it its ability to treat skin diseases as a result of the activity of amino acids necessary to form new cells, and due to the ability of its enzymes to enhance them and renew the deepest layers of the skin (Eshun and He, 2004; Choi and Chung, 2003).

Immune activity is enhanced by the polysaccharides of *A. vera*. As for the importance of A. vera in the treatment of arthritis and joint problems, studies have confirmed that *A. vera* contains salicylic acid, which is analgesic and anti-inflammatory. Moreover, the production of prostaglandins from arachidonic acid is inhibited (Pradeep et al., 2016; Vangipuram et al., 2016; Sahebjamee et al., 2015; Rahmani et al., 2014) .

Protection and treatment of gum diseases and dental bones:

Significant clinical evidence proves the importance of A. vera mouthwash and gel in the prevention and treatment of gingivitis and periodontitis by reducing gingival index, plaque index, and depth of sounding by increasing bone filling and regeneration (Kumar et al., 2014; Kurian et al., 2018).

The importance of *Aloe vera* in fighting viruses

Several experiments were conducted to verify the role of *A. vera* as an anti-herpes simplex type 1 virus and also tested on the H1N 1 influenza virus subtype. The result was clear in the role of the gel (at concentrations from 0.2% to 5%) as an antiviral activity by inhibiting its growth (Rezazadeh et al., 2016).

In other words, the results of in vitro studies confirmed that cactus polysaccharides reduce H1N1 influenza virus replication and virus activity period by interacting with influenza virus particles. To further confirm this efficacy, some in vivo studies were conducted on mice infected with PR8 (H1N1) with SPF BALB/c and indicated an improvement in clinical and pulmonary symptoms. Through the above, the Covid-19 virus can be counteracted by using A. vera extract gel with the advice of a doctor in the recommended doses (Sun et al., 2018).

The Side Effects:

Nothing is 100% perfect. Although A. vera has many benefits, it can have negative effects. The risks of side effects vary based on the type of A. vera supplement, how it is taken, and how it is applied to the skin or taken by mouth. It turns out that aloe latex and whole leaf extract (which contains latex unless the color is removed) have more adverse effects than A. vera gel. It is therefore very important to check with your doctor before using aloe latex and whole leaf extract and before you start using supplements. The use of A. vera gel may cause some mild negative symptoms such as: (Diarrhea- nausea- vomiting- Stomach ache) (Lee et al., 2014).

Recommended Dosages:

It is best to follow your doctor before taking *A. vera* as a supplement because there are some side effects and risks to taking it and the risk varies depending on the type of *A. vera* itself, the human age, weight and health status of the patient. There are no recommended standard doses, but when talking about *A. vera* gel, it is somewhat safe and 300 milligrams of it can be taken in two doses per day, which may improve blood sugar (Alinejad-Mofrad et al., 2015).

It is essential that you return to your healthcare provider to discuss the use of all nutritional supplements and this is especially important when using high-risk supplements. To protect against negative symptoms. Sometimes oral forms of *A. vera* come in capsules, powders, and juices. Dosages of available supplements vary greatly, and this is partly related to the type of *A. vera* supplement as well (Guo and Mei, 2016).

Conclusion

In the end, we should note the importance of *A. vera* L. plant and its role in medicine, or so-called alternative medicine, where it is used as a drug to treat gastrointestinal diseases because it contains anti-inflammatory drugs, polysaccharides, antimicrobials, and wound healing. Added to this is its use in the treatment of skin diseases (wounds, burns).

The aim of this article is to verify the active ingredients of the *A. vera* plant responsible for these activities, And the generalization of its use in the treatment of many viruses, and one of the most important points included in the article is to prove the role of *A. vera* in treating the Covid-19 virus in light of the outbreak of the Corona pandemic. A very important point must be made, particularly in the future of *A. vera*, as an ascending treatment for

cancerous diseases, as an anti-tumor, and as a resistant to diabetes. With regard to its role in the treatment of orthopedic diseases, experiments have been conducted to prove this, especially in the treatment of osteoporosis, and the results have been positive. In the future, efforts must be intensified to conduct many research and studies on the *A. vera* plant and to exploit its various components in the treatment of many diseases, especially in light of the spread of pandemics and unknown diseases. And through findings and studies based on the importance of *A. vera* in treating many diseases. We need to give it a lot of attention and try it clinically in the treatment (diabetes, cancer, osteoporosis).

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