ISSN: 0976-7126
Agrawal *et al.,* 11(3):6516-6519, 2020

International Journal of Pharmacy & Life Sciences
Open Access to Researcher

Jatropha curcus plant as Antiviral agent and as a Biodiesel

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Article info

Received: 30/01/2020

Revised: 28/02/2020

Accepted: 25/03/2020

www.ijplsjournal.com

Abstract

Virual diseases are most widely spreading disease occurring worldwide. Most people affected with the viral diseases like COVID- 19 will experience mild to moderate respiratory illness. The best way to prevent and slow down transmission is by frequently washing your hands or by using an alcohol based rubs also by maintaining distance. The plant jatropha curcus can also be used for the treatment against corona and it is also used as biodiesel. The present study focuses on the use of jatropha curcus plant for its antiviral activity and biodiesel.

Keywords: Virus, COVID- 19, Biodiesel.

Introduction

Viruses are microorganism that can not be seen by naked eye that are existing on earth everywhere. They can infect animals, plants, fungi and even bacteria. They consist of genetic material, RNA or DNA surrounded by a coat of protein, lipid or glycoloipids. Viruses do not have ribosomes so they cannot make proteins. This makes them totally dependent on their host. They are the only microorganism that cannot reproduce without a host cell. They can replicate only in a host cell by inserting their genetic material in to the host body and there they reproduce also take over the host's functions**.**

Most Commonly Occurring Viral Diseases Are

- Small Pox
- Measles
- Rubella
- Hepatitis
- Polio
- AIDS
- SARS

The most widely spread viral disease in today's scenario is COVID- 19.

Corona Virus

Corona viruses are found in avian and mammalian species. They resemble each other in morphology and chemical structure: for example, the corona viruses of humans and cattle are antigenically related. There is no evidence, however, that human corona viruses can be transmitted by animals. In animals, various corona viruses invade many different tissues and cause a variety of diseases, but in humans they are only proved to cause mild upper respiratory infections, i.e. common colds. On rare occasions, gastrointestinal corona virus infection has been associated with outbreaks of diarrhea in children.

Multiplication

The virus enters the host cell, and the uncoated genome is transcribed and translated. The mRNAs form a unique "nested set" sharing a common 3′ end. New virions form by budding from host cell membranes.

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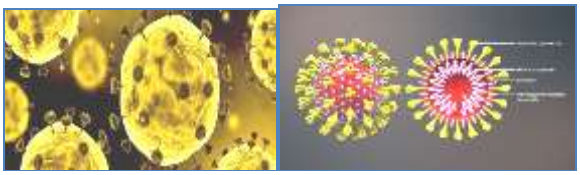
Pathogenesis

Transmission is usually via airborne droplets to the nasal mucosa. Virus replicates locally in cells of the ciliated epithelium, causing cell damage and inflammation.

Control

Treatment of common colds is symptomatic; no vaccines or specific drugs are available. Hygiene measures reduce the rate of transmission.



The corona viruses were originally grouped into the family Corona viridae on the basis of the crown or halo-like appearance given by the glycoprotein-studded envelope on electron microscopy.

Some common symptoms of this infection:

- Headache
- Sore throat
- Cough
- Shortness of breath
- Fever
- Chest pain
- Pneumonia
- Kidney failure

***Jatropha curcus* Plant**

Jatropha is a genus of flowering plants in the spurge family, Euphorbiaceae.

Origin and Distribution

The origin of J. curcas remains controversial as it can be found over a wide range of countries in Central and South America. It is native to Central America but now grows naturally in most tropical areas of the world. In India it occurs in wild, semi wild and cultivated state in almost all biogeographical zones from the coastal areas to the outer Himalayan ranges

Morphological description

Jatropha curcas is a multipurpose perennial shrub/ small tree of 3-6 m height. It may be evergreen or deciduous, depending on climate. It has a short tap root, robust laterals and many fine tertiary roots. The stem is woody, erect, cylindrical, solid and branched. Branches are stout, green and semi woody. Leaves are palmate and have 5-7 shallow lobes and are arranged in alternate with spiral phyllotaxis. Length and widths of leaves varies from 16-21 and 14-18 cm and are cauline and ramel, ex-stipulate, petiolate. Petioles are 12-19 cm long. Venation is multicostate, reticulate and divergent type.

Chemical Content of plant

Apigenin, vitexin, isovitexin, phytate, saponins and a type of lectin known as curcin. The seeds contain 27–40% oil (average: 34.4%)

Medicinal uses of Jatropha Curcus

1. Jatropha curcas is known for various medicinal uses. Its antimicrobial, anti-cancer and anti-HIV activity
2. The root decoction of Jatropha curcas is used for the treatment of eczema, scabies, ringworm, gonorrhea, dysentery, diarrhea
3. antiviral properties: its broad-spectrum activity, for cytotoxicity and its potential to inhibit hemagglutinin protein of viruses
4. used as a antidote of venom of some specific snake
5. Modern research has supported the traditional uses. For example, the latex has antibiotic properties against Candida albicans, Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus and Streptococcus pyogens. It also has coagulating effects on blood plasma.
6. The juice of the bark is used in the treatment of malarial fevers, and is also useful in reducing swellings caused by inflammation. This juice is also applied externally to treat burns, scabies, eczema and ringworm.
7. Jatropha oil is an environmentally safe, cost-effective renewable source of non-conventional energy and a promising substitute for diesel, kerosene and other fuels.

***Jatropha curcus* activity against virus**

Jatropha curcas is known for various medicinal uses. Its antimicrobial, anti-cancer and anti-HIV activity has been well recognized. Because of its broad-spectrum activity, we investigated aqueous and methanol leaf extracts for cytotoxicity and its potential to inhibit hemagglutinin protein of influenza virus. The bioactive compounds from leaf extracts were characterized by high-performance thin layer chromatography which revealed the presence of major phytochemicals including flavonoids, saponins and tannins. The cytotoxic concentration 50 for aqueous and methanol extracts were determined using trypan blue dye exclusion assay. Inhibition of hemagglutinin protein was assessed using minimal cytotoxic concentrations of the extracts and $10^{2.5}$ TCID50 (64 HA titre) of the Influenza A (H1N1) virus with different exposure studies using hemagglutination assay. Aqueous and methanol extracts were found to be non toxic to kidney cells below concentration of 15.57 and 33.62 mg/mL respectively. Inhibition of hemagglutinin was studied using reducing hemagglutination titre which confirmed that the J. curcas extracts have direct effect on the process of virus adsorption leading to its inhibition. Our results provide the information which shows the potential of Jatropha extracts in the treatment of various viruses infection. With an established reduced toxicity and prevention of infection by inhibiting hemagglutinin protein, these extracts and its derivatives may be further developed as broad spectrum anti-corona drugs for prevention and treatment of infections by different types of coronaviruses with further mechanistic studies on anti-corona.

Jatropha curcus's seed oil used as a biodiesel

Jatropha curcas as a non-edible methyl ester biodiesel fuel source is used to run single cylinder, variable compression ratio, and four-stroke diesel engine. Combustion characteristics as well as engine performance are measured for different biodiesel- diesel blends.

Jatropha incentives in India is a part of India's goal to achieve energy independence by the year 2018. Jatropha oil is produced from the seeds of the Jatropha curcas, a plant that can grow in wastelands across India and the oil is considered to be an excellent source of bio-diesel.

Oils from Jatropha, melon, palm oil, soybean, sugar cane, and used oil can be used to make biodiesel. Jatropha is very important in the production of biodiesel since it is a nonedible plant and will not cause competition on human food. Advances in the use of biodiesel as an alternative fuel are aimed at providing cheap and renewable energy, which is easy to manufacture and more importantly clean and more environmentally friendly. The production of this fuel can be encouraged at the grass root level to aid ordinary Nigerians use biodiesel as fuel alternative. This will fill the gap and more importantly relieve pressure on crude oil as the dominate fuel in the running of equipment,

Jatropha oil has been used in India for several decades as biodiesel for the diesel fuel requirements of remote rural and forest communities; jatropha oil can be used directly after extraction (i.e. without refining) in diesel generators and engines. Jatropha has the potential to provide economic benefits at the local level since under suitable management it has the potential to grow in dry marginal non-agricultural lands, thereby allowing villagers and farmers to leverage non-farm land for income generation. As well, increased Jatropha oil production delivers economic benefits to India on the macroeconomic or national level as it reduces the nation's fossil fuel import bill for diesel production (the main transportation fuel used in the country); minimising the expenditure of India's foreign-currency reserves for fuel allowing India to increase its growing foreign currency reserves (which can be better spent on capital expenditures for industrial inputs and production). And since Jatropha oil is carbon-neutral, large-scale production will improve the country's carbon emissions profile. Finally, since no food producing farmland is required for producing this biofuel (unlike corn or sugar cane ethanol, or palm oil diesel), it is considered the most politically and morally acceptable choice among India's current biofuel options; it has no known negative impact on the production of the massive amounts grains and other vital agriculture goods India produces to meet the food requirements of its massive population. Other biofuels which displace food crops from viable agricultural land such as corn ethanol or palm biodiesel have

caused serious price increases for basic food grains and edible oils in other countries.

Jatropha curcas seeds contain between 27 and 40 % triglycerides that can be used to produce a better quality substitute eco-fuel. The Jatropha plants have been chosen for massive production of renewable biodiesel because they have no competitor among the other commercial food or cash crops. But in addition to these qualities, Jatropha plants play a crucial role also in the environment, for instance as degraded land developers, soil erosion controllers and carbon sequesters.

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Cite this article as:
Agrawal A., Prajapati H., Shukla P. and Gupta A.K. (2020). *Jatropha curcus* plant as Antiviral agent and as a Biodisel, *Int. J. of Pharm. & Life Sci.*, 11(3): 6516-6519.
Source of Support: Nil
Conflict of Interest: Not declared
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