

COVID-19 Infection Inhibition by Nimbu (*Citrus limon* Linn.) Infusion, Decoction and Tincture

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ABSTRACT

The Indian System of medicines has played a vital role in our country in providing medical care to the society since antiquity. India is a country with a strong attachment for the traditional or folk medicine. The main aim of the present study was to collect the scattered information on treating corona virus infection by *Nimbu* (*Citrus limon* (L.) Rutaceae family) infusion, decoction, and tincture with its phytoconstituents. The latest collected information was based on the detailed interviews with Vaidyas, Hakims and elderly village people, who have the knowledge of medicinal use of plants based on experiences of using them in treating their own common ailments.

Keywords: Corona virus infection, *Citrus limon*, *Nimbu*, Traditional medicine.

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INTRODUCTION

Today every person in the entire world is trying to protect themselves from the infection of COVID-19 virus. Indeed, it is an overly sensitive subject that in today's modern era, there is no medicine to prevent this virus infection to common people. But if all we take some precautions then control of this infection can be largely avoided by this infection. India is the second most populous country in the world by population. But even today, our traditional knowledge is used in the treatment of several diseases and control and prevent diseases to a great extent. A good example of this can be seen in the COVID-19 epidemic in India.

The Indian system of medicine is as old as the Indian history itself, because it formed an integral part of the Indian traditions since time immemorial. Reference to plants used as drugs are often found in old literatures (Atharv-veda, Charak Samhita, Sushruta Samhita etc.). In spite of achievement of allopathic medicines, the Indian traditional system of medicine known as Ayurveda, Unani, Siddha and Naturopathy still continue to provide medical care to majority of the common people on account of their cheaper cost and no side effects. More than 80% drugs used in Ayurvedic formulations are derived from plant sources (Maridass and Britto, 2008). In all about 2000 plants are estimated to find regular use in curing human ailments in the country. Out of these 500 plants are most commonly utilized in preparation of Indian system of medicines (Scartezzini and Sproni, 2000).

Coronavirus was first discovered in the 1930 when an acute respiratory infection of domesticated chickens was shown to be caused by infectious bronchitis virus (IBV) (Najimudeen *et al.* 2020). Coronaviruses are large spherical particles with bulbous surface projections. The diameter of the virus particles is around 120 nm (Chen N *et al.* 2020). Coronaviruses belong to subfamily Orthocoronavirinae, Family Coronaviridae and order Nidovirales. Coronaviruses are a group of related viruses that cause infection and diseases in mammals and birds. In human's body, coronaviruses cause respiratory tract infection that can be mild, such as some cases of the common cold, sore throat, fever and others that can be lethal, such as SARS, MERS and COVID-19 (Gorbalenya *et al.*, 2020). The outbreak of severe acute respiratory syndrome (SARS) in 2003 which had begun the prior year in

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Asia and secondary cases elsewhere in the world, the World Health Organization (WHO) issued a press release stating that a novel coronavirus identified by a number of laboratories was the causative agent for SARS. The virus was officially named the SARS coronavirus (SARS-CoV). More than 8,000 people were infected, of these about 800 people died. A new type of coronavirus was identified in September 2012, initially called Novel Coronavirus 2012, and now officially named Middle East respiratory syndrome coronavirus (MERS-CoV) (Healthcare 2020). The outbreak of COVID-19 was reported in Wuhan, China in December 2019 (Zhou P 2020). Person-to-person transmission of SARS-CoV-2 has been confirmed during the 2019–20 coronavirus pandemic (Chan J.F. *et al.*, 2019 & McKay B. *et al.*, 2020). On 31 December 2019, the outbreak was traced to a novel strain of coronavirus, which was given the interim name 2019-nCoV by the World Health Organization (WHO) later renamed SARS-CoV-2 by the International Committee on Taxonomy of Viruses (Wikipedia).

MATERIALS AND METHODS

During survey on the medicinal plants of Uttar Pradesh, the author came across population of *Citrus limon* (*Nimbu*) in Meerut area, Meerut district (Fig. 1).

Generally, the species is cultivated for its fruits in Uttar Pradesh (Fig. 2). It is widely occurring as a perennial small tree. The flowers and fruits are seen in greater part of the year in this area. Plant has many other common names, but most common name is *Nimbu* in the area. The herbarium specimen



Fig. 1: Map of study area



Fig. 2: Fresh lemon

(Herbarium No. 362) has been deposited in the Department of Botany, Meerut College, Meerut (U.P.). Local Vaidyas or Hakims (Ayurvedic medicine practitioners) and elderly people were interviewed and information on the use of plant fruit was gathered. Local people, having knowledge about Ayurvedic medicine, were also interviewed regarding the use of plant. Interviews were held in the area and information recorded at the spot. The earlier reports on the medicinal use of *Nimbu* do not mention the method of preparing medicine.

Chemical Composition

Rinds of fruits, flowers and leaves contain essential oil which contains alpha-pinene, beta-pinene, d-limonene, linalool, aldehyde and acetic acid. Flavonoids are present in Citrus fruits as their glycosyl derivatives. Flavonoid skeleton is comprised of two aromatic rings which are connected through a pyrone ring (C) in case of flavones or a dihydropyrone ring in case of flavanones. Kaempferol is a natural flavonol, a type of flavonoids which found in a variety of plants and plant derived foods including Kale, beans, tea, spinach and broccoli. Kaempferol

is a yellow crystalline solid with a melting point of 276–278°C (529–532°F).

Lemon peel contains volatile oil. The other constituents of the peels are hesperidin, pectin, calcium oxalate and bitter substances. It contains carbohydrates, sugar, fibre, fat, protein, vitamin C, thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), pantothenic acid (vitamin B5), pyridoxine (vitamin B6), folate (Vitamin 9 and folacin), calcium, iron magnesium, phosphorus, zinc and potassium (Mohanapriya *et al.* 2013).

Therapeutic Uses

It is used as a febrifuge, astringent, alexipharmic, carminative, cooling, detergent, digestive, disinfectant, refrigerant, stimulant, stomachic, anthelmintic, and tonic (Dey 1998).

It is useful in cold, cough, fever, asthma, bilious vomiting, blood purification, constipation, diarrhea, dysentery, dyspepsia, headache, lumbago, sciatica, thirst and urinary calculus.

Method to Prepare the Traditional Medicine for Coronavirus Infection

- A standard infusion is prepared with thin slices of fruit (one fresh lemon) per cup of boiling water, infused for 10 minutes before straining. The infusion is used on the same day as keeping for too long may turn the infusion to be more strong and bitter. To avoid evaporation, the infusion is kept in a pot covered by a lid. The infusion in the dose of 250 mL is used thrice a day for twenty days or until cure.
- To one cup of warm water when add one spoonful of juice and half spoonful of honey should be added. It may use as a tea for twice a day for twenty days or until cure.
- A standard decoction is prepared by gently boiling fresh stem (30–50 gms) per cup of normal water in a small saucepan with the lid on and left to simmer for about 10 minutes. It must be used on the day of preparation. Phytoconstituents of stem should have specified. The decoction in the dose of 250 mL is taken twice a day for twenty days or until cure.
- Fresh leaves (100 gms) are placed in a glass jar with tight fitting lid and 500 ml of spirit is added to it. It is kept for two weeks with occasional shaking, then strained and stored in a glass bottle with tight lid.

Ten drops of the tincture are administered thrice a day for 30 days or till cure. The tincture remains viable for two years.

RESULTS AND DISCUSSION

Study revealed that *Citrus limon* is used as Ayurvedic medicines for coronavirus infection inhibition by *Nimbu* infusion, decoction, and tincture (Fig. 3) in some part of Uttar Pradesh (Tomar, 2018). The latest information was based on the detailed oral interviews held with Vaidyas, Hakims (Ayurvedic Medicine Practitioner) and elderly village people, who have knowledge of medicinal uses of plants in the area (Tomar 2009).

Coronavirus of this type transmit the disease to humans, infections can range from common cold, cough and fever to severe pneumonia. But if we use all precautions then control of this infection can be found. Lemon is a big source of vitamin C and flavonoids. Kaempferol is a type of flavonoids which has been used in medicines such as vaporizers, balms, inhalers etc. due to the presence of major effective components

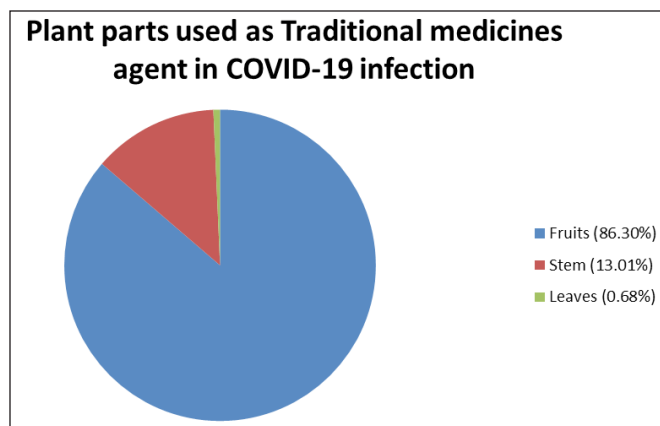


Fig. 3: Citrus limon used as traditional medicine.

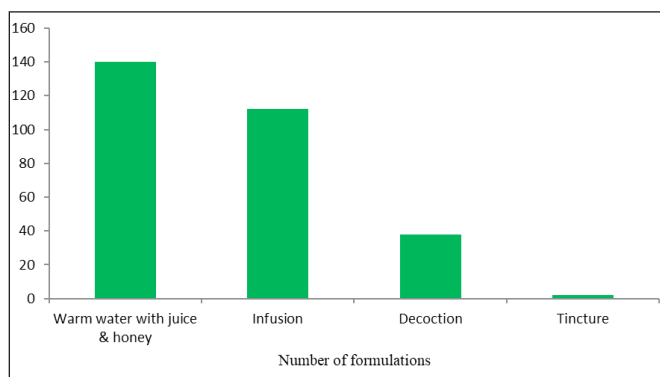


Fig. 4: Method of preparation for crude medicines in the study area

treating in asthma and chronic bronchitis. Kaempferol is used as antibacterial, anti-inflammatory and antiviral properties in some flavonoids. It is proved to be more beneficial including reducing respiratory disorders, fever, sore throat, and cough. These methods to preparation of remedy have been recorded for the first time by the author to cure coronavirus.

ANALYTICAL STUDY

Data were received by open questionnaires, informal interviews and group discussion. Author has collected 292 total individual information from 170 informants (Fig. 4). Most information has been received by elderly people and vaidyas. The collected data indicates that many informants are using the infusion, decoction, and tincture in the area and of these have common information for the against COVID-19 infection.

CONCLUSION

During the survey, the author collected the latest information based on the detailed interviews with the people having knowledge of traditional medicine. These medicines are prepared by various methods such as infusion, decoction, and tincture for the management of coronavirus infection and

provide strength to the body organs and immune system. Now the people move to Ayurvedic traditional medicine system having no side effect to any organs of body. It is also easily providing proper cure with minimum expenditure by Vaidhya (Ayurvedic medicine practitioners) or Hakim. The present work revealed that *Citrus limon* may be used as Ayurvedic medicines for the management of coronavirus infection by *Nimbu* infusion, decoction, and tincture in some part of Uttar Pradesh state of India.

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