

SUDANESE EXPERIENCE OF HERBAL FORMULAS USED DURING COVID -19 INFECTION

Abstract:

Introduction:

The outbreak of Novel corona virus disease 2019 (COVID-19) is the recent worldwide disaster which is considered by the WHO as a Public Health Emergency of International Concern (PHEIC).

Methodology:

A quick survey was done in Khartoum state for the commonly utilize herbs & the succeeded formulas, 652 people participated in this survey either they use these herbs for themselves or their relative use it during the symptoms of COVID-19.

Results:

A 652 people participated in the quick survey for the commonly utilized herbs & the succeeded formulas either they use these herbs for themselves or their relative use it during the symptoms of COVID-19.

Experienced herbs:

The following table represents the herbs used for relieving COVID-19 symptoms as stated by people participated in the survey and the formula used. Other products used as additives include (honey, vinegar, sesame oil, olive oil and salt).

Conclusion:

Sudanese experience that various traditional herbs, usage and different route of administration can effectively relieve primary symptoms like fever, cough and fatigue and reduce the probability of patients developing severe Conditions.

Introduction:

The outbreak of Novel corona virus disease 2019 (COVID-19) is the recent worldwide disaster which is considered by the WHO as a Public Health Emergency of International Concern (PHEIC) (1). The first case was discovered in Wuhan City, China (2, 3) and then after few weeks spread as a global pandemic (4, 5).

The novel corona virus can live on hands, surfaces, objects, mucus membranes, body fluids, respiratory secretions, and spread from person to person through the direct contact (6, 7), which makes the most effective preventive measures are avoiding close contact with people, hand hygiene, clean and disinfect surfaces (8), as there is no specific efficacious treatment or vaccine available for this virus until writing of this paper (9, 10).

The first confirmed case of COVID -19 infection in Sudan was confirmed in 13th March 2020, but now the confirmed cases reached 11.496 case, with death 725 and 6001 recovered cases (29th July 2020 update), unfortunately there is about four thousand active cases. While worldwide totals cases reached 16.7m confirmed, 9.71m recovered and about six thousand deaths (July 2020 update).

There are four defined stages of COVID -19 infection in communities:

- Stage 1 Imported cases in the community.
- Stage 2 Local transmissions.
- Stage 3 Transmissions among the community.
- Stage 4 Epidemic and uncontrolled infections.

According to Sudan FMOH records and statistics we achieve stage 3 now.

COVID-19 affects different people in different ways. Infected people may represent wide range of symptoms but they all declare that there are mild, moderate and severe symptoms. Symptoms generally appears after 2-14 days of exposure to virus, people with mild and moderate symptoms reveals symptoms like:

- 1- Fever or chills

- 2- Cough
- 3- Shortness of breath or difficult breathing
- 4- Fatigue
- 5- Muscle or body aches
- 6- Headache
- 7- New loss of taste or smell
- 8- Sore throat
- 9- Congestion or runny nose
- 10- Nausea or vomiting
- 11- Diarrhea

Emergency symptoms and signs for COVID -19 includes:

- 1- Trouble breathing
- 2- Persistent pain or pressure in chest
- 3- Confusion
- 4- Inability to arouse or stimulate
- 5- Bluish lips or face

Clinical manifestations demonstrate moreover three phases of patient infections:

Phase 1 infection phase (symptoms similar to cold and flu).

Phase 2 pulmonary phase (immune system strongly infected causing respiratory symptoms including low oxygen levels and formation of blood clots)

Phase 3 hyper inflammatory phase (causing injury to vital organs, cytokine storm where body attacks its own tissue) (6, 7)

Methodology:

According to this pandemic infection many medicines were used wide world but unfortunately no definite treatment was subscribed till now, and only symptomatic treatments were used. Though many people seek for experienced herbs used to overcome the first signs of infection. A quick survey was done in Khartoum state for the commonly utilize herbs & the succeeded formulas, 652 people participated in this survey either they use these herbs for themselves or their relative use it during the symptoms of COVID-19.

An up to date (August 2020) search was made in the following databases: PubMed, Science direct and google scholar with the key words: *Acacia nilotica*, *Nigella sativa*, *Zingiberofficinale*, *Syzygiumaromaticum*, *Boswelliacarterii*, *Hisbiscus sabdariffa*, *Citrus aurantiifolia*, *Camellia sinensis*, *Allium sativum*, *Adansoniadigitata* ,*Pimpinellaanisum*, *Citrus aurantiifolia* and/or 'Virus' and 'Anti-virus effect' to investigate the anti-viral effects of these herbs.

Results:

A 652 people participated in the quick survey for the commonly utilized herbs & the succeeded formulas either they use these herbs for themselves or their relative use it during the symptoms of COVID-19.

Experienced herbs:

The following table represents the herbs used for relieving COVID-19 symptoms as stated by people participated in the survey and the formula used. Other products used as additives include (honey, vinegar, sesame oil, olive oil and salt)

No.	Herbs	Formula	usage
1	<i>Acacia nilotica</i> القرض	<ul style="list-style-type: none"> - Acacia Seeds - Acacia Powder +olive oil or sesame oil - Acacia Powder + warm salted water - Macerated Acacia seeds water - Acacia Powder +Nigella powder+ steam water 	<ul style="list-style-type: none"> - Smoke, Lozenges - Paste applied at throat & or chest - Gargle - Antiseptic wash - Inhaler
2	<i>Nigella sativa</i> الحبه السوداء	<ul style="list-style-type: none"> - Nigella Powder+ Acacia powder + tea+ salt+ sesame oil 	<ul style="list-style-type: none"> - Paste applied at throat & or chest

		- Nigella Powder+ acacia powder+ steam water	- Inhaler
3	Zingiberofficinale الجنزبيل	- Zinger powder + warm water - Zinger powder + honey - Zinger powder + lemon +warm water	- Tea - Tea spoon (Oral) - Tea
4	Citrus aurantiifolia الليمون	- lemon drops +vinegar drops +salt +warm water	- Gargle
5	Syzygiumaromaticum القرنفل	- Macerated Syzygium water - Syzygium steamed water	- Gargle - Inhaler
6	Hisbiscus sabdariffa الكركدى	- Macerated Hisbiscus flower hot/cold	-Tea/ drink
7	Adansoniadigitata التبلدى	- Macerated Adansonia fruit	- cold drink
8	Camellia sinensis الشاى	- Tea + lemon drops - tea + salt + vinegar + sesame oil	- drink - Paste applied at throat & or chest
9	Artemisia absinthium الشيح	- tea spoon of Artemisia + tea spoon of nigella	- orally
10	Allium sativum الثوم	- Garlic clove	- orally
11	Pimpinellaanisum اليانسون	- Anise tea	- drink
12	Boswelliacarterii اللبان المر	- frankins. excudate	- lozonges

Literature review about pharmacological effect of herbs on viruses:

1. Acacia nilotica

A.nilotica belonging to family fabaceae, distributed mainly in the tropical and subtropical region of the world, having ~1300 species worldwide. A.nilotica is a species native to Africa and the Indian subcontinent. Different parts (leaves, root, bark, pods, seeds, flowers)of A.nilotica have been recommended for treatment of cancer, colds, congestion, coughs, diarrhea, dysen-tery, fever, gallbladder, hemorrhage, hemo-rrhoids, leucorrhoea, ophthalmia, sclerosis, smallpox, tuberculosis and leprosy.⁷ In addition it also possess antidiabetic, anti-corbutic, astringent, anticancer, antioxidant and antimicrobial properties.⁽¹¹⁾ Mona and et al investigated the anti-influenza virus activity of Acacia nilotica and possible mechanisms of action in vitro. They found that Acacia nilotica has anti-influenza-virus activity and both pre-incubation of virus prior to infection and post-exposure of infected cells with Acacia nilotica extract significantly inhibited virus yields. In this study revealed that Acacia nilotica extract can inhibit both viral attachment and replication and offers new insights into its underlying mechanisms of antiviral action.⁽¹²⁾

2. Nigella Sativa:

Nigella sativa, a dicotyledon of the Ranunculaceae family, has been employed for thousands of years as a spice and food preservative, as well as a protective and curative remedy for numerous disorders, and is known to have many medicinal properties in traditional medicine. ShamimMoolla and et al conducted a review article on antiviral effect of Nigella sativa. They stated that seeds have wide therapeutic effects and have been reported to have significant effects against many ailments such as skin diseases, jaundice, gastrointestinal problems, anorexia, conjunctivitis, dyspepsia, rheumatism, diabetes, hypertension, intrinsic hemorrhage, paralysis, amenorrhoea, anorexia, asthma, cough, bronchitis, headache, fever, influenza and eczema. Thymoquinone (TQ) is one of the most active constituent and has different beneficial properties. Focus on antimicrobial effects, different extracts of N. sativa as well as TQ, have a broad antimicrobial spectrum, including Gram-negative, Gram-positive bacteria, viruses, parasites, schist soma and fungi. They summarized that N. sativa and its derived compounds have been seen to act against a number of human, animals, birds and plant pathogenic viruses. N. sativa may be one of the best sources of anti-viral drugs. ⁽¹³⁾

3. Zingiberofficinale

Jung San Chang and et al found that fresh, but not dried, ginger is effective against human respiratory syncytial virus (HRSV)-induced plaque formation on airway epithelium by blocking viral attachment and internalization. (14)

4. Citrus aurantiifolia:

Seyedeh conducted study and stated that Limon had the most antiviral activity and could reduce viral pathogenicity of NDV as 100 fold. *Matricaria recutita* L., *Allium ascalonicum* L. could reduce activity of virus as 3.8 and 40.5 fold respectively, but *Rosa damascene* did not have any significant effect on virus. Accordingly, three out of four of these extracts were found effective.(15)

5. Syzygiumaromaticum:

Clove (*Syzygium aromaticum*, Myrtaceae) oil contains eugenol, an oily liquid that has proven analgesic and antiseptic properties. Eugenol can cause damage to viral envelopes of freshly formed virions and can cause inhibition of viral replication at the initial stage. The anti-viral activity of eugenol, clove flower bud extract and clove essential oil against Herpes simplex virus has been carried out. Direct inactivation of viruses and inhibition of intracellular and extracellular viruses after replication were observed with eugenol. In another study for antiviral activity against HSV-1 and HSV-2 viruses [38], 50% inhibitory concentration values were 25.6 µg/mL and 16.2 µg/mL for HSV-1 and HSV-2, respectively. Eugenol demonstrated a synergistic action with acyclovir against in vitro replication of herpes virus. Topical eugenol therapy was observed to suppress herpes virus induced keratitis in mouse.(16)

6. Hibiscus sabdariffa

The calyces of *Hibiscus sabdariffa* L. is an ingredient in hibiscus tea. Hibiscus tea contains abundant bioactive compounds including anthocyanins, polyphenols, organic acids, and flavonoids. The in vitro study revealed that the pH of hibiscus tea extract is acidic, and its rapid and potent antiviral activity relied largely on the acidic PH.(17)

7. Adansoniadigitata

Adansoniadigitata (Baobab) is a traditional African medicinal plant with numerous applications, including treatment of symptoms of infectious diseases. Standardized commercial preparations of *Adansoniadigitata* leaves, fruit-pulp and seeds were acquired and extracted with three different solvents, water, methanol and DMSO. The extracts were compared quantitatively for antiviral MIC(100) (minimal inhibitory concentration) values against influenza virus, herpes simplex virus and respiratory syncytial virus and for their effects on cytokine secretion (IL-6 and IL-8) in human epithelial cell cultures. The leaf extracts had the most potent antiviral properties, especially the DMSO extracts and influenza virus was the most susceptible virus. Pulp and seed extracts were less active but significant. The results overall indicated the presence of multiple bioactive compounds in different parts of the plant and these activities could explain some of the medical benefits attributed to traditional leaf and pulp preparations, in the treatment of infectious diseases and inflammatory conditions.(18)

8. Camellia sinensis

Green tea is made from leaves of the *Camellia sinensis* plant. It has been suggested that green tea has a number of positive health benefits, green tea presents both antibacterial and antiviral effects. The beneficial effects of green tea are mainly attributed to the presence of a type of polyphenols known as catechins and formed by several isomers including (-) - epigallocatechin gallate (EGCG), (-) - epigallocatechin, (-) - epicatechingallate, (-) - epicatechin, and (+) - catechin. The catechins in green tea have a wide range of antiviral activity against a variety of viruses that act by interfering with its replication cycle.(19)

9. Artemisia absinthium

Herbal treatments used in Traditional Chinese Medicine were explored to treat coronavirus infections during the Sars-CoV and Mers-CoV outbreaks. Initial studies in China showed the

alcoholic extract of sweet wormwood (*Artemisia annua*) was the second most potent herbal medicine used on the 2005 Sars-CoV.(20)

10. Allium sativum:

Garlic (*Allium sativum*) has been shown to have antiviral activity. Using direct pre-infection incubation assays, the in vitro virucidal effects of fresh garlic extract was determined, its polar fraction, and the following garlic associated compounds: diallylthio-sulfinate (allicin), allyl methyl thiosulfinate, methyl allyl thiosulfinate, ajoene, alliin, deoxyalliin, diallyl disulfide, and diallyltrisulfide. Activity was determined against selected viruses including, herpes simplex virus type 1, herpes simplex virus type 2, parainfluenza virus type 3, vaccinia virus, vesicular stomatitis virus, and human rhinovirus type 2. (21)

11. Pimpinellaanisum

Anisiaetheroleum is the oil obtained from *Pimpinellaanisum* L. (*P. anisum*) by steam distillation. *P. anisum* is one of the oldest medicinal plants that belong to family Apiaceae. The anise oil odour is aromatic while the oil tastes sweet. The plant oil have pharmacological (antimicrobial, hepatoprotective, anticonvulsant, anti-inflammatory, antispasmodic, bronchodilator, estrogenic, expectorant and insecticidal) effects and clinical effects on nausea, constipation, menopausal period, virus, diabetes, obesity and sedative action. (22)

12. Boswelliacarterii:

Boswellia resins, also known as frankincense/olibanum, are obtained from *Boswellia* trees. Incisions are made in the trunks of the trees to produce exuded gum, which appears as milk-like resin and hardens into orange-brown gum resin. *Boswelliaserrata* gum resin showed antiviral activity against the mosquito-transmitted chikungunya virus (CHIKV) and vesicular stomatitis virus in the laboratory. (23)

Discussion:

- Fortunately, Sudanese experience that various traditional herbs, usage and different route of administration can effectively relieve primary symptoms like fever, cough and fatigue and reduce the probability of patients developing severe Conditions.
- The current pharmacological literature carries strong evidence to support herbal therapy and herbal medicines as effective and preventive agents against Covid-19.
- The authors believe that there are potential approaches for application of herbs and succeeded formulas to prevent infection and strength immunity revealing the Antiviral and Antimicrobial effects of many herbs against corona viruses.
- Different herbal extracts aligned with natural additives conclude effective herbal formulas assisting in reducing local transmission eg. Herbal aerosols and herbal sanitizers.
- Additionally, the anti-influenza virus activity of essential oil vapors of Citrus, Nigella, Anise, Eucalyptus and Syzygium have been confirmed by numerous studies.
- However more social experienced investigate the effect of powdered dry herbs orally e.g. Hibiscus, Adansonia, Camellia and Artemisia, others like zinger and garlic are trailed fresh. Whereas other herbs administered in different forms gargle, smoke, lozenges and paste are shown in the table above.

Conclusion:

Sudanese experience that various traditional herbs, usage and different route of administration can effectively relieve primary symptoms like fever, cough and fatigue and reduce the probability of patients developing severe Conditions.

References:

1. Euro surveillance Editorial Team, note from the editors: World Health Organization declares novel coronavirus (2019-nCoV) sixth public health emergency of international concern, Euro Surveill, 2020 Feb;25 (5): pii= 200131e, <https://doi.org/10.2807/1560-7917.ES.2020.25.5.200131e>.
2. Hengbo Zhu, Li Wei and Ping Niu, The novel coronavirus outbreak in Wuhan, China,

- Global Health Research and Policy, 2020, 5:6, 1-3.
3. Jean-claude Perez, Wuhan Covid-19 Synthetic Origins and Evolution, International Journal of Research - Granthaalayah 8(2), 285-324, (February 2020):285-324.
 4. AbdulazeezAdeyemiAnjorin, The coronavirus disease 2019 (COVID-19) pandemic: A review and an update on cases in Africa, Asian Pacific Journal of Tropical Medicine, April 2020, 13(4):1-5.
 5. Coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK –seventh update, 25 March 2020, European center for disease prevention and control, PP 1-5
 6. Meng L, Hua F, Bian Z., Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine, Journal of Dental Research, 2020 March, Vol. 99(5), 481-487.
 7. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B, Transmission routes of 2019-nCoV and controls in dental practice, International Journal of Oral Science, 2020 March 3; 12 (1):1-6.
 8. How to protect yourself and others, Centers of Disease Control and Prevention Coronavirus disease (COVID-2-19), available on <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html> (Accessed May 2020).
 9. J.H. Beigel, , K.M. Tomashek, L.E. Dodd et al, Remdesivir for the Treatment of Covid-19 — Preliminary Report, The new England journal of medicine, May 22, 2020, PP 1-12.
 10. Centers for Disease Control and Prevention, Information for Clinicians on Investigational Therapeutics for Patients with COVID-19, Updated April 25, 2020 Available on: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/therapeutic-options.html>, (Accessed may 2020).
 11. Deepti Gupta, AnjanaGoel and A.K. Bhatia, Studies of anti viral property of Acacia Nilotica, Journal of Environmental Research And Development, Vol. 5 No. 1, July-September 2010, PP 141- 152
 12. Mona TimanIdriss, Malik Suliman Mohamed, SarawutKhongwichit, NatthidaTongluan, Duncan R Smith, N H Abdurahman, N H Azhari and Alamin Ibrahim Elnima, Antiviral activity and possible mechanisms of action of Acacia nilotica against Influenza A virus, Journal of bacteriology and parasitology, Vol. 7, issue 5, 2016, PP 28.
 13. ShamimMolla, Md. AbulKalam Azad, Md Ali Azam Al Hasib, M. Monayem Hossain, Md., SohelAhammed, Shohel Rana, Muhammad Torequl Islam, A REVIEW ON ANTIVIRAL EFFECTS OF NIGELLA SATIVA L., Pharmacology online, 2019, volume 2, PP 47- 53.
 14. Jung San Chang and et al, Fresh ginger (*Zingiberofficinale*) has anti-viral activity against human respiratory syncytial virus in human respiratory tract cell lines, Journal of ethnopharmacology, 2013 Jan 9;145(1):146-51.
 15. SeyedehElhamRezatofighi and et al, Antiviral Activity of Citrus Limon, *Matricariaarcutita* L., *Allium ascalonicum* L., and *Rosa damascene* against Newcastle Disease Virus, November 2014
 16. KannisseryPrمود, Shahid H. Ansari and Javed Ali, Eugenol: A Natural Compound with Versatile Pharmacological Actions, Natural product communications, 2010 volume 5 (12), 1999- 2006.
 17. Yohei Takeda, Yuko Okuyama, Hiroto Nakano, YasunoriYaoita, Koich Machida, Haruko Ogawa &Kunitoshi Imai, Antiviral Activities of *Hibiscus sabdariffa* L. Tea Extract Against Human Influenza A Virus Rely Largely on Acidic pH but Partially on a Low-pH-Independent Mechanism, Food and environmental virology, 12, pages9–19(2020).
 18. SelvaramiVimalanathan, Multiple inflammatory and antiviral activities in

- Adansoniadigitata (Baobab) leaves, fruits and seeds, August 2009, Journal of medicinal plant research 3(8), 576- 582.
19. Muhammad Shahid Mahmood, Antiviral effects of green tea (*Camellia sinensis*) against pathogenic viruses in human and animals (a mini-review), African Journal of Traditional, Complementary and Alternative Medicines 13(2):176
 20. Peter H. Seeberger, *Artemisia annua* to be tested against coronavirus, Max- Planck-GESELLSCHAFT, April 18 2020
 21. Norbert D. Weber¹ , Douglas O. Andersen¹ , James A. North¹ , Byron K. Murray, Larry D. Lawson, Bronwyn G. Hughes, In Vitro Virucidal Effects of *Allium sativum* (Garlic) Extract and Compounds, *Planta Med* 1992; 58(5): 417-423.
 22. Khaled Mohamed Mohamed Koriem, Approach to pharmacological and clinical applications of *Anisiaetheroleum*, Asian Pacific Journal of tropical biomedicine, Volume 5, Issue 1, January 2015, Pages 60-67.
 23. Christine von Rhein and et al, Curcumin and *Boswelliaserrata* gum resin extract inhibit chikungunya and vesicular stomatitis virus infections in vitro, November 2015, Antiviral research 125, DOI 10.1016/j.antiviral.2015.11.007

Reviewer's Copy