Journal of Medicinal Plants Studies
www.PlantsJournal.com

ISSN (E): 2320-3862
ISSN (P): 2394-0530
NAAS Rating: 3.53
www.plantsjournal.com
JMPS 2020; 8(5): 49-51

Received: 18-07-2020
Accepted: 26-08-2020

Shilpa Patil
Assistant Professor, Department of Rasa Shastra, Faculty of Ayurveda, Institute of Medical Sciences, Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur, Uttar Pradesh, India

Shweta Patil
Associate Professor, Department of Panchakarma, Dr. Rajendra Gode Ayurveda College, Amravati, Maharashtra, India

Corresponding Author:
Shilpa Patil
Assistant Professor, Department of Rasa Shastra, Faculty of Ayurveda, Institute of Medical Sciences, Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur, Uttar Pradesh, India

An appraisal on antiviral assets of some spices

Shilpa Patil and Shweta Patil

DOI: https://doi.org/10.22271/plants.2020.v8.i5a.1195

Abstract
Background: The spices are inseparable part of Indian Kitchen. According to the region their amount of usage varies. In spite of taste, flavor, fragrance they bears therapeutic potential too. The Antiviral herbals and their remedies are getting attention due to Covid-19 all over the globe. In search of the available herbals we focus on the antiviral potential of certain Indian spices which are easily available and can be used on daily basis.
Aim: To review the antiviral set of properties of Spices.
Material and Method: Intensive search of available literature on spices through the various search engines like Google, Google scholar, Pub med etc. is done for their antiviral properties.
Conclusion: These properties of spices could be utilize to check the viral attacks by converting them into suitable formulation for the interest of common public.

Keywords: Antiviral, benefit, Indian spices, Bioactives compounds

Introduction
The spices are inseparable part of Indian Kitchen. According to the region their amount of usage varies. In spite of taste, flavor, fragrance they bears therapeutic potential too. The Antiviral herbals and their remedies are getting attention due to Covid-19 all over the globe. There is lack of effective therapeutics for the most of viral diseases, emergence of antiviral drug resistance, and high cost of some antiviral therapies necessitate finding new effective antiviral compounds. Additionally, the existing antiviral therapies are not always well-tolerated or quite effective and satisfactory. Hence, the increasing requirement for antiviral substances will be more highlighted. Plants as a rich source of phytochemicals with different biological activities including antiviral activities are in interest of scientists.

Material and Method
Intensive search of available literature on spices through the various search engines like Google, Google scholar, Pub med etc. is done. In search of the available herbals we focus on the antiviral potential of certain spices which are easily available and can be used on daily basis in Indian cooking like ginger, garlic, cumin seeds, muster, turmeric, clove, cardamomum, fenugreek, saffron, black pepper, bishop's weed.

Result and Discussion
The antiviral spices established through the various researches are as follows
1. Garlic: Mehrbod P *et al*. conducted study on antiviral effect of garlic extract on Enfluenza Virus. They measured the amount of the viral genome synthesized at different times after treatment, RNA extraction, Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and free band densitometry software. Although the precise mechanism has not been defined but it was found that garlic extract with a good selectivity index (SI) has inhibitory effect on the virus penetration and proliferation in cell culture [1].

2. Ginger: Sulochana Kaushik *et al.* conducted study on cell culture for Chikungunya virus. when Vero cells were pre-treated with MNTD and half of MNTD of Z. officinale extract respectively. Similarly, in co-treatment, when MNTD, half of MNTD of Z. officinale and Median tissue culture infective dose CHIKV were inoculated simultaneously, then the viability of Vero cell-line was increases by 52.90% and 49.02% respectively. The rhizome extracts of Z. officinale have high potential to treat CHIKV [2].

3. Cumin Seeds: Sajid Umar *et al.* performed experimental study on 130 non vaccinated turkey poults. they were challenged with H9N2 Virus and check the immune response and pathogenesis. significantly higher antibody titer againstH9N2was found in tuckeys fed with 6%cumin seeds. thus they concluded that supplement of cumin would enhance responsiveness and suppress pathogenecity of influenza virus [3].

4. Mustard seeds: N.K. Lee *et al.* studies the subcritical water extract of mustard seeds for A/H1N1 in non fat milk for the use as antiviral food. The antiviral activity of SWE of Brassica evaluated as n-hexane, ethanol and hot water etract. SWE has highest activity as antiviral and it was maintained in non fat milk. Author have suggested that SWE of Brassica may be used as food supplement in diary products against the viral infections [4].

5. Turmeric: Moghadamtousi SZ *et al*. studies the compound, Inosine monophosphate dehydrogenase (IMPDH) enzyme from turmeric due to rate-limiting activity in the *de novo* synthesis of guanine nucleotides is suggested as a therapeutic target for antiviral and anticancer compounds. Among the 15 different polyphenols, curcumin through inhibitory activity against IMPDH effect in either noncompetitive or competitive manner is suggested as a potent antiviral compound via this process The study of different bioconjugates of curcumin, namely, di-*O*-tryptophanyl phenylalanine curcumin, di-*O*-decanoyl curcumin, di-*O*-pamitoyl curcumin, di-*O*-bis-(*γ*,*γ*)folyl curcumin, C^4-ethyl-*O*-*γ*-folyl curcumin, and 4-*O*-ethyl-*O*-*γ*-folyl curcumin, against variety of viruses including parainfluenza virus type 3 (PIV-3), feline infectious peritonitis virus (FIPV), vesicular stomatitis virus (VSV), herpes simplex virus (HSV), flock house virus (FHV), and respiratory syncytial virus (RSV) assessed by MTT test showed the potent antiviral activity of curcumin and its bioconjugates against different viral pathogens for further studies. Also, di-*O* tryptophanylphenylalanine curcumin and di-*O*-decanoyl curcumin revealed remarkable antiviral activity against VSV and FIPV/FHV with EC_{50} values of 0.011 μM and 0.029 μM, respectively [5].

6. Clove: Diego Francisco Cortés-Rojas *et al*. reviewed antiviral activity of eugeniin, a compound isolated from *S. aromaticum* and from *Geum japonicum*, was tested against herpes virus strains being effective at 5 µg/mL, and it was deducted that one of the major targets of eugeniin is the viral DNA synthesis by the inhibition of the viral DNA polymeras. aqueous extracts of *S. aromaticum* (L.) Merr. et Perry and other plants as *Geum japonicum* Thunb., *Rhus javanica* L., and *Terminalia chebula* Retzus among others showed strong antiherpes simplex virus type 1 (HSV-1) activity when combined with acyclovir. This synergic activity was stronger in the brain that in the skin and it was also proved that those combinations were not toxic to mice. [6]

7. Cinnamon: Tamam SM *et al*. conducted study on one hundred and fifty one day-old chickens were fed by five diet supplements with 0%,0.1%,0.3% of essential oil, and 1%,3% of cinnamon powder for 30 days serum and whole blood were collected for evaluation of T. protein, S. albumin, S. globulin, total antioxidant, lysozyme activity, phagocytic percent and phagocytic index. cinnamon zeylanicum essential oil and powder exhibit significant T. protein, Globulin and albumin and total ant-oxidant activity in chickens. Findings of the study establish cinnamon zeylanicum essential oil and powder had antiviral activity by appreciable immunostimulatory activity by increasing survival percent (challenge test) lysozyme, PI and phagocytic activity [7].

8. Fenugreek: Khanssa A *et al*. The bioactive components of the seeds of fenugreek (*Trigonella Foenum-graecum* L.) in methanolic fenugreek seed extract scrutinized by Gas Chromatography-Mass Spectrometry, Azelaic acid, di(2-ethylhexyl) este *in vitro* exhibited the antiviral property [8].

9. Cinnamomum: Hayashi K, *et al.* suggested that,Trans-cinnamaldehyde (CA), is main essential oil constituent isolated from Cinnamomi cortex. It inhibits growth of influenza A/PR/8 virus *in vitro* and *in vivo* and is used to treat acute respiratory infectious diseases. Similarly, Premanathan M, *et al.* studied Cardiospermum helicacabum (shoot + fruit) extracts against HIV-1 and HIV-2. The silver nanoparticles derived from Cinnamon extract enhanced the antiviral activity. In another study Yeh CF, *et al.* suggested that silver nanoparticles synthesized from Cinnamomum cassia extract were found effective against H7N3 Influenza A Virus. These effectively decrease HRSV induced plaque formation and syncytium formation in respiratory mucosal cell lines. It removes off obstructions occurred in airway epithelia due to HRSV infection through inhibiting viral attachment, internalization and syncytium formation [9, 10, 11].

10. Saffron: Sepehr Soleymani *et al*. have tested the anti-HSV-1 and anti-HIV-1 activities of Iranian saffron extract and its major ingredients including crocin and picrocrocin as well as cytotoxicity *in vitro*. The data showed that the aqueous saffron extract was not active against HIV-1 and HSV-1 virions at certain doses (i.e., a mild activity), but crocin and picrocrocin indicated significant anti-HSV-1 and also anti-HIV-1 activities. Crocin inhibited the HSV replication at before and after entry of virions into Vero cells. Indeed, crocin carotenoid suppressed HSV penetration in the target cells as well as disturbed virus replication after entry into the cells. Picrocrocin was also effective for inhibiting virus entry and also its replication. monoterpen aldehyde showed higher anti-HSV effects after virus penetrating in the cells. Generally, these sugar-containing compounds extracted from saffron showed to be effective antiherpetic drug candidates [12].

11. Black pepper: Priya N. C *et al*. conducted research on seeds of *Piper nigrum.* it's chloroform and methanolic extracts were collected by reflux method and extracts were evaluated against Vesicular stomatitis virus and human para influenza virus on HeLa cell lines. Cytotoxicity assay carried out by MTT assay and LDH measurement. Anti-viral activity of *Piper nigrum* in chloroform extract showed higher activity than *Piper nigrum* methanolic extract against vesicular stomatitis Indiana virus and Human para influenza virus on HeLa cell line. extract of *Piper nigrum* treatment showed inhibition of growth of HeLa cells at IC50 values of 551.58, 24.18 and 17.47 µg/ml at 24, 48 and 72 hours of incubation respectively. LDH measurement showed 100% of inhibition at 260 mg/ml for both extracts of *Piper nigrum*. These results suggest that *Piper nigrum* have significant anti-viral and anti-cancer activity in HeLa cells. HPTLC analysis of both the pepper in chloroform extract at 254nm and 366 nm was done which produces different bands. At 254 nm resolutions of

bands were poor and at 366 nm well resolved bands with different intensity of color of bands confirmed the presence of piperidine [13].

12. Bishop's weed: Hussein G *et al*. conducted the study on one hundred fifty-two methanol and water extracts of different parts of 71 plants commonly used in Sudanese traditional medicine for their inhibitory effects on hepatitis C virus (HCV) protease (PR) using *in vitro* assay methods. Of these, eight extracts, methanol extracts *Trachyspermum ammi* were found the most active (≥90% inhibition at 100 µg/mL) against hepatitis C virus (HCV) protease [14].

Table No. 1: Overviwe of the spices along with the antiviral properties

S.N.	Name of the spices	Latin name	Family	Part used	Effective against virus
1.	Garlic	*Allium sativum*	Amaryllidaceae	Rhizome	Enfluenza Virus.
2.	Ginger	*Zingiber officinale*	Zingiberaceae	Rhizome	Chikungunya virus
3.	Cumin seeds	*Cuminum cyminum L*	Apiaceae	Seeds	Avian influenza(H9N2)
4.	Mustard seeds	*Brassica juncea*	Brassicaceae	Seeds	Influenza virus (A/ H1N1)
5.	Turmeric	*Curcuma longa*	Zingiberaceae	Rhizome	feline infectious peritonitis virus (FIPV), vesicular stomatitis virus (VSV), herpes simplex virus (HSV), flock house virus (FHV), and respiratory syncytial virus (RSV)
6.	Clove	*Syzygium aromaticum (L.) Merr.*	Myrtaceae	Flower buds	Antiherpes simplex virus type 1 (HSV-1)
7.	Cinnamon	*Cinnamomum zeylanicum*	Lauraceae	Bark	Newcastle Disease Virus (NDV)
8.	Fenugreek	*Trigonella foenum*	Fabaceae	Seeds	Influenza
9.	Cinnamomum	*Cinnamomum tamala*	Lauraceae	Leaves	Influenza/PR/8 virus, human immunodeficiency virus (HIV)
10	Saffron	*Crocus sativus*	Iridaceae	Stigmas	HSV-1 and human immunodeficiency virus (HIV-1)
11.	Black pepper	*Piper nigrum*	Piperaceae	Seeds	vesicular stomatitis virus (VSV) and Human para influenza virus(HPIVS)
12.	Bishop's weed	*Trachyspermum ammi*	Apiaceae	Fruit	hepatitis C virus (HCV)

References

1. Mehrbod P, Amini E, Tavassoti-Kheiri. Antiviral Activity of Garlic Extract on Influenza Virus, Iranian Journal of Virology. 2009; 3(1):19-23.
2. Kaushik S, Jangra G, Kundu V, Yadav JP, Kaushik S. Anti-viral activity of *Zingiber officinale* (Ginger) ingredients against the Chikungunya virus, Indian Virological society, Springer, 2020
3. Umar S, Munir MT, Subhan S, Azam T, Nisa Q *et al*. Proactive and antiviral activity of Nigella sativa against avian influenza (H9N2) in tuckeys. J. Saudi Society of Agricultural Sciences, 2016, 1-24.
4. Lee NK, Lee NK, Lee JH, Lee SM, Lim KA, Lee YB *et al*. Antiviral activity of subcriticsl water extract of *Brassica juncea* against influenza virus A/H1N1 in non-fat milk, J. Dairy Sci. 2014; 97:5383-86.
5. Moghadamtousi SZ, Kadir HA, Hassandarvish P, Tajik H, Abubakar S, Zandi K. A Review on Antibacterial, Antiviral, and Antifungal Activity of Curcumin, Biomed Res Int. 2014; 2014:186864.
6. Diego Francisco Cortés-Rojas, Claudia Regina Fernandes de Souza, Wanderley Pereira Oliveira Clove. (*Syzygium aromaticum*): a precious spice. Asian Pac J Trop Biomed. 2014; 4(2):90-96.
7. Tamam SM, Abd el Hamid MS, Samah M, Helmyc, Marwa A, Nakhriry. The Anti-viral and Immunomodulatory Activity of Cinnamon zeylanicum Against "NDV" Newcastle Disease Virus in Chickens. International Journal of Sciences: Basic and Applied Research. 2017; 32(2):251-62.
8. Khanssa A, Shaheed, Manal A, Alsirraj, Shatha A, Allaith *et al*. The biological activities of seeds extracts for fenugreek and black cumin and its inhibitory influences toward some pathogens. Iraq Med J. 2018; 2(2):46-50
9. Hayashi K *et al*. Inhibitory effect of cinnamaldehyde, derived from Cinnamomi cortex, on the growth of Influenza/PR/8 virus *in vitro* and *in vivo*. Antiviral Res. 2007; 74(1):1-8.
10. Premanathan M *et al*. A survey of some Indian medicinal plants for anti-human immunodeficiency virus (HIV) activity. Indian J Med Res. 2000; 112:73-77.
11. Yeh CF *et al*. Water extract of Cinnamomum cassia Blume inhibited human respiratory syncytial virus by preventing viral attachment, internalization, and syncytium formation. J Ethnopharmacol. 2013; 147(2):321-326.
12. Sepehr Soleymani, Rezvan Zabihollahi, Sepideh Shahbazi, Azam Bolhassani. Antiviral Effects of Saffron and its Major Ingredients, Curr Drug Deliv. 2018; 15(5):698-704.
13. Priya NC, Saravana Kumari P. Antiviral Activities and Cytotoxicity Assay of Seed Extracts of *Piper longum* and *Piper nigrum* on Human Cell Lines,International Journal of Pharmaceutical Sciences Review and Research. 2017; 44(1):197-202**.**
14. Hussein G, Miyashiro H, Nakamura N, Hattori M, Kakiuchi N. Inhibitory effects of Sudanese medicinal plant extracts on hepatitis C virus (HCV) protease, Phytother Res. 2000; 14(7):510-16.