Herbal Approach for Treatment of Viral Infestations

Dr Vimal Arora

1. Professor, University Institute of Pharma Sciences, Chandigarh University

*Corresponding author: draroravimal@gmail.com (Arora)

Abstract:
Viruses are defined as cellular, ultramicroscopic, metabolically inert nucleoprotein particles having RNA or DNA strands. Viral replication is a potential drug target, or simply antiviral drugs can specifically target a single viral enzyme, responsible for viral replication. The emergence of resistant virus strains due to mutation etc has again set new challenges and contributed a lot for therapeutic failure. As per our traditional system of medicine i.e. Ayurveda, viral infections can only be treated by body immune system and the commonly used herbs/plants and herbal formulations like immunomodulators, Antioxidants, Mineral Supplements can be used for treating such viral infestation along with its effective management via cleanliness and other precautions.

Key words: Viral infestations, immunomodulators, Antioxidants

How to cite this article: Arora V (2020): Herbal approach for treatment of viral infestations, Ann Trop Med & Public Health; 23(S21): SP232025. DOI: http://doi.org/10.36295/ASRO.2020.232025

Introduction:
As we all know, nature is comprised of diversified components like, earth, water, air and living creatures and many more. One of such interesting creature is “Microorganisms” that are reported to be covering a large part of the earth and even their availability is evident in biological system too, like human body. Microorganisms are reported to be helpful microbes on one hand and harmful on the other hand. Thus microorganisms perform a very important role in maintaining eco systems. On the other hand some microorganisms cause various diseases and ailments and microbes involved are Bacteria, fungi, protozoa, algae and virus. Viruses are defined as cellular, ultramicroscopic, metabolically inert nucleoprotein particles having RNA or DNA strands, with or without a lipid-containing envelope. Viruses are reported to be different from other microbes like bacteria etc., and are considered as the obligate intracellular parasites. The host cell machinery is being utilised for their spreading or propagation. These can cause various ailments as simple as flu or common cold, and as fatal as African fever. Thus these are called as the a cellular parasites present in the cellular host.

Mechanism of action of viruses:
Viruses are considered to be disease causing or the pathogenic moieties having number of mechanism for invading living system and they do this via own unique arrangement of surface molecules, which is key feature for different strains i.e. every strain has its unique surface characteristic. This unique feature empowers them to invade into host cells by specifically connecting their surface structures (antigen/protein structures) with the specialized sites of target living cell (receptor) and this simply is explained as the antigen-receptor linkage. One
more type of virus also exists that have lipid envelope around its structure. The second interesting fact about the virus is that it is incompetent to replicate without a host cell. This special characteristic of viruses makes it challenging and problematic to plan a treatment to outbreak the virus attack or to hinder the process of their replication, without affecting the host or the infected cells. The replication cycle of virus involves attachment and entry to the host cell, transcription of viral mRNA, replication of viral genome, assembly and budding as progeny virus particles, regardless of their genetic materials (DNA or RNA). Thus as a theoretical concept the viral replication is a potential drug target, or simply antiviral drugs can specifically target a single viral enzyme, responsible for viral replication.\textsuperscript{5, 6} So, it is always challenging to design an effective treatment for viral infestations, where drug can target specifically the viral machinery with least or no effect on the host cell.

In last few years the scenario of treating viral infestations has been changed tremendously, on the contrary the emergence of resistant virus strains due to mutation etc has again set new challenges and contributed a lot for therapeutic failure.\textsuperscript{7, 8, 9} There are many other medicinal systems around the globe which had targeted viruses namely Ayurvedic and Siddha traditional herbal medicine, Traditional Chinese Medicinal System and many more.

**Ayurvedic and herbal medicines:**

Ayurvedic system of traditional medicinal system is one of the most promising medical treatments that is being adopted in various parts of the world from centuries. The word “Ayurveda” is derived from the Sanskrit language which comprises of ‘ayu’ means life and ‘veda’ means knowledge.\textsuperscript{10} In India, medicinal plants have been used since the vedic times, among these many of the plants or herbs are part of our routine diet in the form spices, fruits and vegetables and as home remedies for normal health issues. In one of the main eminent Ayurveda literature namely “Atharva Veda” (about 200 B.C.), in which the description of medicinal plants has been compiled as a separate chapter named as “Ayurveda”. Furthermore in one such other compilation “Sushruta Samhita” (compiled by Sushruta about 400 B.C.) 700 herbal drugs are classified under 37 classes. Additionally, scientific cataloguing of 500 crude drugs in 50 classes of herbal remedies has been described on the basis of their remedial properties in his renowned treatise “Charka Samhita”. The medicinal potential of plants have been evaluated using trial and error method by number of scientists at different times.\textsuperscript{11} It is projected that about 35,000 to 70,000 plant species across the globe can be used medicinally useful. Due to side effects associated with most of the synthetic medicinal products, people are moving towards Ayurvedic system of medicine.\textsuperscript{10} As far as market value of herbal products is concerned it is reported that about one third of adult in America use herbal medicinal products in a year and about 64 % population of the world uses herbal medicine at one or more time.\textsuperscript{12}

**Principles of Ayurveda:**

In last few years number of experimental studies has been carried out to evaluate the worth of Ayurvedic and herbal formulations in terms of their efficacy. As per our traditional system of medicine, viral infections can only be efficiently taken care by our own immune system and the condition when the immune system overthrows a viral infection, the ailment is known as self-limited disease. Medical treatment is directed toward relief of discomfort, symptoms and to overcome the changes in body functions due to any pathogen etc. that
could cause death. Other approaches like treatment of symptoms like reduction of fever, replacement of body fluids and support of breathing are examples of the provision that may be required.\textsuperscript{1}

There are many fundamental principles of Ayurveda used to treat various ailments based up on the physio-pathology of the disease state. However, along with pathogenic infestations there are environmental factors such as diet, hygiene, which play a major role.\textsuperscript{13}

One such concept is that of Ama Dosha according to Ayurveda, this is major cause of all sort of vhadhi that is states of ailment via impairment of Agni, so it may be considered as Agni Dosha. Amamajorily compares the food material taken by an individual with toxic moieties that causesdoshas or disease to occur, rather than nourishing the body. Due to this impaired function of Agni, the un-metabolized food contents (liquid state or rasa) are not properly absorbed and are retained in gastro-intestinal track, where it got fermented and hence is harmful to our body; and is named as poisons.\textsuperscript{1}

Another factor that can also be taken care of, in case of such complicated diseases is oxygen, which plays a vital role in number of biological functions such as utilization of nutrients, ATP production and the elimination of xenobiotics. It can also aggravate some oxidative events within cells that lead to cell damage via transformation to more reactive forms like superoxide radical (O\textsubscript{2}-), hydroxyl radical (OH-) as well as peroxides that can lead to destruction of useful or essential enzymes, structural proteins and can incite uncontrolled chain reactions such as lipid peroxidation or auto-oxidation reactions.\textsuperscript{14} Oxidative stress occurs as a result of either over production of precursors and/or declined efficiency of inhibitory and scavenging systems. This stress can be amplified and propagated by an autocatalytic cycle producing cell death and tissue damage. Removal of such reactive oxygen species can thus be a probable mechanism for efficient defence against various diseases.

**Basis of treatments:**

There are number of mechanism which can be explored for fighting against viral infestations and some these are discussed here under:

**Antioxidant Potential:** A variety of antioxidant mechanisms can be opted to protect the tissue against oxidative damage, which includes enzymes like superoxide dismutase and glutathione peroxidase that help in removing the harmful oxidants in the intracellular environment.\textsuperscript{15} Some low molecular weight organic substances are also available that can react with the free radicals and cause their damage (free radical scavengers) which includes vitamin C and E etc., that can be easily provided to the body either as supplements or via diet (fruits etc.). Natural antioxidants strengthens the endogenous antioxidant defences from reactive oxygen species and restores the optimal balance by neutralizing such species, thus are gaining immense importance by virtue of their critical role in preventing such complicated diseases.

**Mineral and trace element supplementation:** Mineral elements constitute a very small proportion of the living tissue, yet they are important for the vital processes of life. The trace elements are getting focussed from the last few years and are recognized as vital for optimal human health; due of their varied functions and characteristics. They interact with the macromolecules such as enzymes, pro-hormones, pro-secretory granules and biological membranes, thus serve a variety of catalytic, structural and regulatory functions. So these can be considered essential for proper growth, working as well as functioning of the living system and thus their deficiency can be
underlined as one of the causal factor for various metabolic disorders and certain other complications.\textsuperscript{16}

**Immune enhancers:** The leukocytes (white blood cells) play a very important role in fighting against any diseased state and this mechanism of self-defence is called as “innate immune response” which is general and non-specific. Similarly in Ayurveda, the concept of Agni, or enzyme function, contributes the first immune response. This concept of immunity is very close to the modern understanding as proteins (enzymes) as major contributors in primary immune response. The normal functioning of Agni is treated as the single most important factor to resist viral infection in Ayurveda. Agni impairment is mainly due to poor diet, over diet (salt, sugar, etc.), stress, fatigue, excessive consumption of stimulants like tea, coffee, etc., along with certain other factors like smoking, and sedentary lifestyle. So it may be understood as if Agni function is compromised at any level, and lead to affect liver, plasma, blood, etc., the risk of viral infections is increased.

The second major issue in tackling viral infestation is “mutation” i.e. virus adapts itself to the changing conditions of environment and body conditions. According to Ayurveda the mutation occurs because at the early stage of infection or simply viral invasion, the Agni (immune response) either fails to identify it correctly or eradicate it. Thus due to this impaired Agni function the virus enters the systems of the host body and propagate.

**Some important natural drugs or herbals:**

The role of traditional medicine in developing of anti-viral drugs and formulations is been studied and discussed in many eminent research studies and publications. These domains of traditional medicinal systems like Ayurveda and others involving herbs has eventually emerged as a promising field of interest in developing anti-viral medications. The potential of herbal products against diversified strains of viruses are supposed to be due to wide variety of active phytochemicals, likeproteins, peptides, glycosides, flavonoids, alkaloids, terpenoids, saponins, organosulfur compounds, polyenes, coumarins, limonoids, sulfides, chlorophyllins, furyl compounds, polyphenolics and thiophenes.\textsuperscript{17,18} The anti-viral potential of these phyto-constituents can be explicated on the basis of their antioxidant properties, scavenging capabilities, inhibitory role in DNA, RNA synthesis, preventing viral propagation and many more.\textsuperscript{17,19} Some of the important immunity enhancers and/or immune-modulators are: Panax ginseng, Achilleamillefolium, Aloe vera , Andrographi spaniculata, Withania somnifera, Tinospora cardifolia, Mangiferaindica, Ocimum sanctum, Morus alba, Asparagus racemosus, Bauhinia varigate, Gymnemasylvestre, Embelicaofficinalis, Artemisia annua Lin, Euphorbia hirta, Aeglemarmelos, Trigonellafoenumgraecum, Aloe vera, Aeglemarmelos, Syzygiumcumminii, Laurusnobilis and many more.\textsuperscript{20}

**Management of Viral infestations:**

The viral infection cases are managed very typically, as it includes number of factors like infecting strain, morbidity rate, mortality rate, symptoms etc.; as that in case of recently declared pandemic due to NCovid19 and thus it includes the following:

1. Cleanliness of body and clothes.
2. Isolation or quarantine of patients.
3. Sanitization and cleanliness of facilities.
4. Proper medication for symptomatic relief.
5. Immunity enhancement via health supplements like antioxidants.
6. Mental health and wellness.
8. Social distancing.
9. Covering of face while talking, coughing and sneezing.

Conclusion:
Ayurveda is not just dealing with symptomatic treatment, but it covers our mental and physical dimensions like life style, dietary management and exercise and thus it also provides preventive system of medicine. In Ayurveda different approaches of therapeutic treatment are used in variety of microbial infestations. Earlier it was thought that our traditional medicine system do not cover therapeutic measures for viral infestations, but the experimental studies related to the evaluation of antiviral efficacy of herbal drugs carried out in last two decades have supported the use of natural or herbal drugs in such typical ailments.

References: