



## **PHYTO-PHARMACEUTICAL IN MANAGEMENT OF DISEASES**

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### **Article Information**

Received: 5<sup>th</sup> June 2020

Revised: 29<sup>th</sup> December 2020

Accepted: 23<sup>rd</sup> January 2021

### **Keywords**

*Rasayana, immunomodulatory,*

*Respiratory Syncytial Virus,*

*Traditional Chinese Medicine*

*(TCM), Central Drug Standard*

*Control Organisation*

### **ABSTRACT**

Herbs or plants were known as the oldest friend of mankind. Ayurvedic medicine has herbs as the wealth in pharmacological platform. Material Medica of Ayurveda is devoted to “Rasayana ” drugs used to possess immunomodulatory activity. One-fourth of the drugs in daily use are of plant origin. Vast form of rich plant kingdom present in the environments, offer vast source of potential phytochemicals having antiviral therapeutic responses. It is rather economical and quickly possible to assess the activity of natural compounds in-vitro in the laboratory than in-vivo testing. Recently, World Health Organization (W.H.O.) recommends ancient remedies in National Health Care Programmes as such drugs are easily available at low priced, are comparatively safe, effective and the people have faith in such remedies. For pharmaceuticals purposes, the quality of medicinal plant material must be as effective as that of other medicinal preparations. Phytopharmaceutical compounds have received attention for their effective antiviral potential in pandemic like coronavirus. Several natural compounds used in the Indian traditional system called as Rasayana which enhance the body’s resistance have attracted the eye of scientists worldwide. Respiratory Syncytial Virus (RSV) is the commonest childhood respiratory pathogen, infecting nearby 90 per cent of entire infant in the primary 12-18months of life. The intake of human milk with all of its immunomodulatory constituents may grant protection against RSV disease. The novel phytopharmaceuticals regulation allows the drug development using cutting-edge techniques of solvent extraction, modern formulation development, fractionation, potentiating steps etc. When the NDA (National Defence Academy) got approval from CDSCO (Central Drug Standard Control Organisation) acknowledged, the marketing status of the novel phytopharmaceutical drug acts like unique chemical entity-based drug. Hope with the novel phytopharmaceutical regulation, the Indian scientists would develop noble intentions to discover phytopharmaceutical drugs for unmet medical demands. The licensing of herbal remedies with ambiguous benefits and few risks, as evidence by an extended history of safe and effective medicinal use and rise societal healthcare costs.

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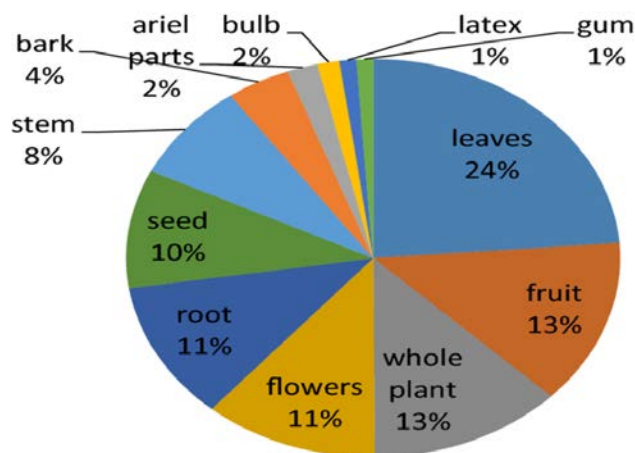
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## INTRODUCTION

The word phyto-pharmaceutical springs from the Greek designations phytón refers to plant and phármakon for medicinal drugs. As per D and C act 1940, Phytopharmaceutical drug are often defined as the purified as well as standardized fraction with minimal four biologically active or phytochemical compounds which were qualitatively and quantitatively assessed for extract of a medicinal plant or its part, for internal or external use of citizenry or animals for inspection, medication, mitigation, or prevention of any disorder but does not indicate administration by parenteral route. [1, 2]. Basically, these are herbal remedies which are prepared from herbal substances like dried plant parts like bark, leaves or the roots traditionally already known to heal unwanted physical conditions or illnesses. These days, mostly herbal preparations are extracts from herbal substances in enrich form with known extraction solvent, drug-extract ratios and processing steps finalized as pharmacologically active dry extract. Herbal medicine was most probably originated from conventional academic medicine. Even at present, nearby three-fourth of medicines contain active pharmaceutical ingredients (API) that were originally derived from natural substances.



**Fig. 1:** Statistical graphic representation of Plant parts used as medicine.

### Salient features about phytopharmaceuticals drugs:

The acceptance of naturally derived drugs by Drug Controller General of India would have the alike status for marketing as that given for an artificial compound-based drug. This novel class of medicine would uplift introduction of in depth evaluation through biomedical sciences, therefore would help within the acceptance of and expand the utilization of herbal products by modern medical profession. All over the world,

there is a rising interest and demand for natural compounds as a possible source of therapeutics for unsatisfied medical demands, which would bring this aspiration one step closer to reality. Upon finalization of this regulation, which need to be done as soon as possible, number of national laboratories, scientists groups, and industrial research and developments (R&Ds) who have been working on botanical leads can look forward to take this route for getting marketing permissions. Creative entrants/investors will get encouraged to invest in this route for drug development.

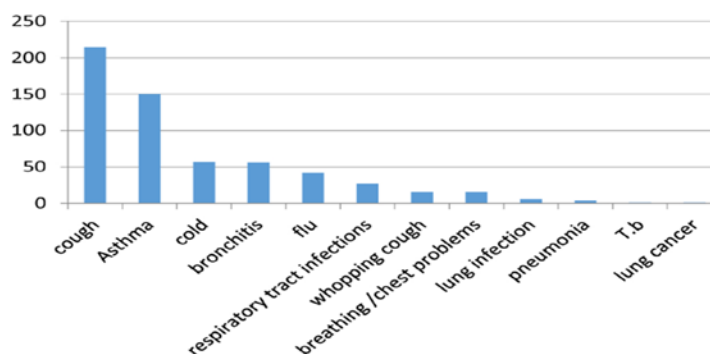
In contrast to psychoactive drugs, which would have worked on this project as herbal medicines, consist of a plethora of natural compounds that used to activate or modulate various target systems in an organism. The phyto-pharmaceuticals based on evidence increasingly mentioned in clinical practice guidelines are first-line therapy in various diseases and indications. Even many classical active components, like the pain reliever morphine, atropine originates from natural compounds. Clinically proven phyto-pharmaceuticals were on highest demands, their effects and safety was randomly verified, controlled clinical trials.

### Why phyto-pharmaceutical drugs are being selected from natural origin by the author to fight against present situation?

In general, One-fourth of the drugs were being used as plant origin. The rich plant kingdom found in a variety of environments, offer a vast source of potential herbal compounds with antiviral and therapeutic responses. It is rather economical and quickly possible to screen the activity of plant compounds in-vitro in the laboratory than in-vivo testing. Natural compounds have received increasing attentiveness due to their antiviral potential.

The antiviral drug field came of age in 1960 with the initial antiviral molecule, acyclovir, finding its way to the clinic in 1959 by Gertrude B. Elion. The AIDS in 1981 and other subsequent emergence pandemics like COVID-19 have drastically altered the field of antiviral research. Typically example is constituents of *Sarracenia purpurea* which is found active particularly against Herpes Simplex Virus (HSV). Plant extracts from *Phyllanthus* spp. showed inhibitory effect on Hepatitis B virus (HBV) by suppressing virus replication and translation of the viral proteins. Calanolide A is another such

antiviral plant compound which has been converted as an antiviral agent against HIV. Glycyrrhizin a compound found in *Glycyrrhiza glabra* has antiviral activity against many viruses such as HIV infections



**Fig. 2:** Traditional medicinal plants used for respiratory disorders

The report was submitted on 24, January 2020 that the first patient having symptoms of COVID-19 pneumonia, was recovered from hospital after treatment with Traditional Chinese Medicine (TCM), although its effectiveness remains uncertainly [3].

Breastfeeding infants have an immunological advantage when compared with formula fed infants, as evidenced by both decreased incidence of infections during infancy but also reduced properties for a number of chronic conditions, including chronic wheeze and asthma. Potential immunomodulators which continue to be alike as human milk including widely accepted mediators, like cytokines & maternally derived leukocytes, but may also include phytochemical factors. The immunomodulators may have adverse effect on development through direct and indirect influences on the native cells of the immature infant immune system. Respiratory Syncytial Virus (RSV) is the commonest childhood respiratory pathogen, infecting nearly 90 per cent of entire infant in the primary 12-18 months of life. The consumption of human milk with all of its immunomodulatory constituents may grant protection against RSV disease [4].

### **Materials and Methods:**

Phytopharmaceutical class of medicine have genesis in conventional system of medicine also as phytomedicine. The perspective of Indian market is an emerging platform for phytopharmaceutical. Standardised extracts derived from

*Commiphora wightii*, *Ginkgo* are few examples representing phytopharmaceutical class of medicine in Indian market. The above mentioned standardised plant extracts are broadly prescribed by practitioners of western medicine.

The market of formulations or medicine originating from medicinal plants is essentially supported prescription of allopathic and Ayush practitioners. It has been noticed that larger number of the Ayurveda practitioners prescribes classical or patent and proprietary medicines in clinical practice. The necessity of the hour is to bring reputed herbal drugs under the umbrella of phytopharmaceuticals. Moreover, it has been expected that in coming days, herbal market shall be governed by supercritical extracts due to improved bioavailability, reduced toxicity and improved dosage form. Nanophytomedicine is additionally knocking door of the pharmaceutical industry. In near future, supercritical extracts, nano phytomedicine and phytopharmaceuticals could also be seen as drive of the herbal industry [5].

For instance, tomatoes have active plant ingredients are not necessarily individual active ingredients, but a combination of various other ingredients. However, within the larger number of cases plant products are used as models for chemically synthesised pharmaceutical substances: 2-hydroxybenzoic acid, which is produced by the plant *Filipendulaulmaria* (commonly referred to as meadowsweet), and a 2-hydroxybenzoic acid derivative, Aspirin, which is produced by willows, have an extended tradition of relieve pain and fever, but are produced using chemical methods for over a century [6].

Usually Herbal products or its parts of one molecule can be used for various different functions. Flowering plants, for instance, attract pollinators with secondary metabolites that also debar herbivores. This is often because these compounds have both odours and pigments which prevent insects from feeding on the plant but are not alleged to eat it. Which cause plants to produce nectar which they use to reward pollinating insects for not eating them. Secondary fruit metabolites also have similar functions. Immature fruits, which have not yet produced seeds, must not be eaten, because of which these are often bitter and poisonous. The toxin gradually degrades as ripe fruits, like in *Solanum lycopersicum L.* While green tomatoes are toxic and may cause intestinal problems, red tomatoes are safe to eat because the toxic steroid alkaloids are weakened [7].

**METHODS:****Preparing the plant Material:**

- ✓ Firstly, Plants have to be dried before extraction.
- ✓ Then, freeing of plant takes place.

General methods Extraction: To choose the specific method of extraction, based on texture and water content of the extracted plant product.

**Some important applications of plants and its compound:**

- ✓ Green Tea (*Camellia sinensis*): Polyphenols from leaves, anti-oxidant, anti-cancer inhibiting tumor initiation as well as cell proliferation
- ✓ Ginger (*Zingiber officinale*): from the rhizome, anti-tumor, Over 12 compounds with anti-oxidant activities greater than vitamin E, anti-emetic (inhibits vomiting).
- ✓ Garlic (*Allium sativum*) Onion (*Allium cepa*): sulphur-containing organic compounds from leaves, Anti-atherosclerosis, anti-hypertensive and Anti-carcinogenic, Venom in high amounts.
- ✓ Soybeans (*Glycine max*): Contains phytoestrogens such as isoflavones, decline health risks associated with climacteric: osteoporosis as well as cardiovascular disease in women, declines the rate of prostate, colon and breast cancer.

**Ethno botany gives detailed instructions about the suitability of natural products as medicinal plants**

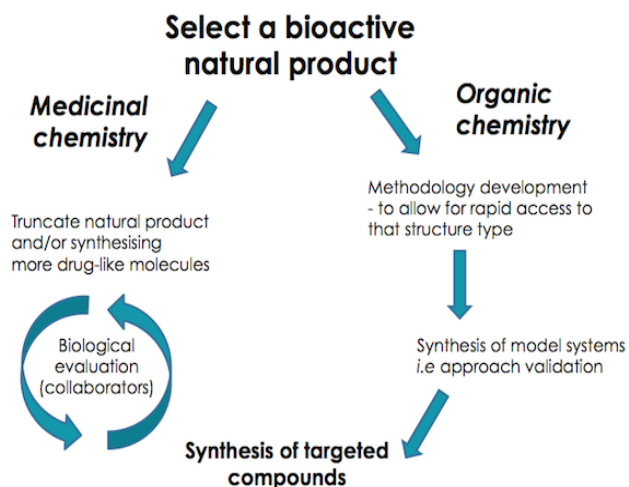
Ethnomedicine can be used as a synonym for traditional medicine. Based on whether the drug is being developed for the diagnosis of digestive or cardiovascular symptoms, for instance, specific assays was chosen and optimal plants products were selected. The latter involves a variety of possible approaches were use of traditional plant products for making food supplements.

**High degree of standardisation against natural variation:**

The necessity to standardise the plants as much as possible, otherwise our product batches will have identical major variations". Not entire plants of a specific species are suitable for the continuous production of dietary supplements; plant differences also adversely affect the pharmacological activity of a herbal extract.

Consequently, great care should be taken to choose a plant with optimal ingredients. Identical offspring is produced in order that the effect the harvesting date has on the standard of the extract are often expand and the optimal harvesting time determined.

When the sought-after effect, potential active natural compounds and the right plant genotype have been identified, the plant will be cultivated in order to obtain the required quantity of standardised primary material for subsequent investigations. The best suited method is for extracting the necessity compounds will also get detected.



**Fig. 3:** Process of synthesis of targeted compounds from bioactive natural product.

When the technical details for extracting a plant's active constituents are in place, the other step is to look at the pharmacology of the plant extracts. Vast bioassays are carried out to investigate the effect of the compounds. A few bioassays acknowledge on the potential inhibitory effect a plant extract may have on enzymes, others on the binding of the active compounds to receptors or on their effect on cells, that either recombinant proteins or cell cultures are used for this purpose.

**Identical safety tests for natural and artificial drugs:**

The absorption of extracts within the body, their potential toxicity or interactions with various drugs, besides, in-vivo studies - behavioural studies in mice, for instance- are administered by partner laboratories. The bioassays also can also produce false-positive results. Therefore, necessity to pay more attention to those, as plant tannins that may be present within the extract may cause unspecific effects thanks to their potential to bind and precipitate proteins. So as to exclude such effects, Vital Solutions uses standardised test kits that it adapts and validates to the difficulty under investigation. Various tests necessity to be administered so as to check the security and efficacy of natural drugs, and are not any less strict than those required for

assessing synthetic drugs. Novel drugs, albeit natural or chemical, necessity to undergo similar testing procedures [8].

### **IMPROVED/ NON CONVENTIONAL METHODS OF EXTRACTION:**

Generally, conventional extraction processes are time consuming e.g., maceration done for some 2-7 days; involving bulk amount of solvents and ultimately there may be thermal decomposition of the target molecule like in the case of Soxhlet extraction. The demand for brand spanking new techniques has encouraged the event of other alternative extraction techniques.

#### **1. Supercritical fluid extraction (SFE) method:**

A supercritical fluid has a erratic ability to diffuse through solids such as, gas and dissolve materials like a liquid. Even, it can readily alter in density upon minor change in pressure or temperature. These properties make it satisfactory as a substitute for organic solvents in SFE. Carbon dioxide and water are the foremost commonly used supercritical fluids. The supercritical fluid extract of *Citrus hystrix* and *Azadirachta indica* can be applied as a constituent of cosmetic product and medicines because of its antimicrobial behavior.

#### **2. Pressurized Liquid or Accelerated solvent extraction:**

This method works in accordance with the principle of static extraction with superheated liquids. There is increased efficiency because of higher solubilities of analytes in solvents at extreme temperature, higher diffusion rate and disruption of the strong solute-matrix interaction. This method to be efficient in extracting kavain from the powdered roots of *Piper methysticum*. [10]

The modern age may have supremacy of synthetic drugs but phytomedicine is making a robust and dramatic comeback. The popularity of Ayush systems of drugs is growing at a rapid pace. Traditional Chinese medicine has already established as top leader of the herbal market [11].

### **CONCLUSION**

- Breastfeeding is recommended until two years of age of infants as it provides immunological advantage when compared with formula fed infants, as evidenced by both decline incidence of infections during infancy but also reduced a number of chronic conditions, such as chronic wheeze. Respiratory Syncytial Virus (RSV) is the

commonest childhood respiratory pathogen, infecting nearby 90 per cent of all infant in the primary 12-18months of life. The consumption of human milk with all of its immunomodulatory constituents may contribute to protection against RSV disease.

- Recently, WHO recommended that herbal plants such as *Aretmisia annua* are being considered as possible treatment for COVID-19. Thus concluded, immunomodulators and antiviral drugs may be promising treatment choices for treatment of COVID-19 infections.
- The patient having symptoms of COVID-19 pneumonia, was recovered from hospital after medication with Traditional Chinese Medicine (TCM), although its effectiveness remains uncertainly.
- There is new specific antiviral treatment recommended for COVID –19 & no vaccine is currently available.
- However no antiviral medicament has been approved, several approaches have been proposed such as Lopinavir / ritonavir (400/100mg orally every 12 hours).
- Preclinical studies suggested that Remdesivir (GS5734) - an inhibitor of RNA polymerase with in vitro activity against multiple RNA viruses, could be effective for both prophylaxis & therapy of HCoV infections.
- The use of Chloroquine an anti-viral agents and effectively inhibit SARS-CoV-2 virus in-vitro. Remdesivir (GS-5734) as a nucleoside analogue which inhibit MERS-Cov-2 and SARS-Cov-2 in in-vitro.
- Moreover, that phytopharmaceutical plants such as *Aretmisia annua* are being considered as possible treatment for COVID-19. Thus concluded, Phyto-Pharmaceutical drugs may be promising treatment choices for medication of COVID-19 infections.

The respect for ancient wisdom is reflected in the form of phytopharmaceuticals drugs. The use of herbal extracts to treat illness is well known in various nations where billions of dollars are spent on pharmacognosy research to identify and market natural medicinal drugs. Use of herbal products during Pregnancy usually perceive as a safe, natural alternative to conventional drugs and often use them to enhance their wellbeing or for the diagnosis of non-life threatening conditions such as constipation. The licensing of herbal remedies with equivocal benefits and few risks, as evidence by a long history of safe use, i.e, safe and effective medicine for all and increases societal healthcare costs.

**FINANCIAL ASSISTANCE**

Nil

**CONFLICT OF INTEREST**

The authors declare no conflict of interest.

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