

## Chapter 17

# A Perspective on the Phytopharmaceuticals Responsible for the Therapeutic Applications

**Rajesh K. Joshi**

*Regional Medical Research Centre (Indian Council of Medical Research), India*

### ABSTRACT

*The word phytopharmaceutical deals with a complex mixture of compounds derived from the plant source that is used as a medicine or drug. Primitive human societies have been depending on plants and plant products for various remedies. Several plants in the different forms have been reported in traditional medicine and to find a rational for the treatment of various diseases than to isolated single compounds. Many of the single compounds isolated from the plant origin are effectively used in the medicine. The search of natural products in drug discovery has been greatly enhanced in the last few years. The impetus to use phytopharmaceutical agents for the treatment of disease, most of the plant based drugs are quite safe and have lesser adverse effects and are claimed that it works as synergistic effects.*

### INTRODUCTION

Primitive human societies have been depending on plants and plant products for various remedies. In certain areas, these folk medicinal prescriptions are endemic and have survived through ages from one generation to next through word of mouth. They do not exist as written knowledge. Generally, these systems of medicines depend on old people's experiences. The person, prescribing these medicines has so-called scientific knowledge about the diseases. Indigenous systems of medicine are specially conditioned by cultural heritage and myths. In India, the reference to the curative properties of some herbs in the Rig Veda seems to be the earliest records of use of plants in medicine. The identity of several plants referred to in Suktas of the Rig Veda can be fixed with reasonable certainty, e.g. of *Semal*, *Pithvan*, *Palash*, and *Pipal*. A more detailed account is available in the Atharva Veda. The period of Rig Veda is

DOI: 10.4018/978-1-5225-1762-7.ch017

estimated to be between 3500 and 1800 B.C. After the Vedas, there is no information on the development of this science in India for a period of about 1,000 years. Then appeared the two most important works on Indian system of medicine, the works of Charak and Susruta, namely the Charak-Samhita and Susruta-Samhita. The latter deals with about 700 drugs, some of these are not indigenous to India. In the modern era, the medicinal plants are being replaced more and more by synthetic drugs. But of late it is being realized that synthetics, though useful as life saving drugs, are responsible for many hazardous side effects. This has led to the revival of interest in herbal medicine with the reawakening of efforts to promote indigenous system of medicine.

Since antiquity, man has used plants to treat common infectious diseases and some of these traditional medicines are still included as part of the habitual treatment of various maladies. For example, the use of bearberry (*Arctostaphylos uva-ursi*) and cranberry juice (*Vaccinium macrocarpon*) to treat urinary tract infections have been reported in different manuals of phytotherapy, while species such as lemon balm (*Melissa officinalis*), garlic (*Allium sativum*) and tee tree (*Melaleuca alternifolia*) are described as broad-spectrum antimicrobial agents (Rios & Recio, 2005).

Variety of plant extracts, such as an extract of the root of *Sophora flavescens*, an extract of stem bark of *Magnolia obovata*, and oil of *Melaleuca alternifolia*, have been used as traditional medicines for microbial infections, strongly suggests that natural products are the major source of important antimicrobial agents (Sohn et al., 2004). Several essential oils and their isolates have been found to exhibit strong antibacterial and antifungal activity. According to Wan et al. (1998), the majority of the essential oils assayed for their antibacterial properties showed a more pronounced effect against the Gram positive bacteria. The resistance of Gram negative bacteria to essential oil has been ascribed to their hydrophilic outer membrane, which can block the penetration of hydrophobic compounds into target cell membrane (Wan et al. 1998). The essential oils of the medicinal and aromatic plants rather than their extracts that have had the greatest use in the treatment of infectious pathologies in the respiratory system, urinary tract, gastrointestinal and biliary systems, as well as on the skin (Rios & Recio, 2005). Various essential oils viz., *Plectranthus mollis* (Joshi, 2014a), *Ocimum basilicum* (Joshi, 2014b), *Artemisia absinthium* (Joshi, 2013a), *Ocimum gratissimum*, *Ocimum sanctum* (Joshi, 2013b), *Cyathocline purpurea* (Joshi, 2013c), *Senecio belgaumensis* (Joshi, 2012a), *Lantana camara* (Joshi, 2012b), *Tridax procumbens* (Joshi & Badakar, 2012), *Phlomis bracteosa* (Joshi et al., 2011), *Feronia elephantum* (Joshi et al., 2011), *Erigeron floribundus* (Joshi et al., 2011), *Craniotome furcata* (Joshi, 2010) and *Anaphalis nubigena* var. *monocephala* (Joshi et al., 2009) have been reported promising *in vitro* antimicrobial activity.

The essential oils seem to have no specific cellular targets. As typical lipophiles, they pass through the cell wall and cytoplasmic membrane, disrupt the structure of their different layers of polysaccharides, fatty acids and phospholipids and permeabilize them. Cytotoxicity appears to include such membrane damage. The cytotoxic property is a great importance in the applications of essential oils not only against certain human or animal pathogens or parasites but also for the preservation of agricultural or marine products (Bakkali et al., 2008). Cytotoxic activities of essential oils or their major components, sometimes activated by light, have also been demonstrated in the mammalian cells *in vitro* by short-term viability assays using specific cell staining or fluorescent dyes including NRU (Neutral Red Uptake) test, MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-tetrazolium bromide) test, Alamar Blue (resazurin) test, Trypan Blue exclusion test or Hoechst 33342 and propidium iodide test (Bakkali et al., 2008).

Essential oils have a calming, stimulating, pain alleviating and mood enhancing effect. They improve the functioning of internal organs like heart, lungs etc. Till now they were on the periphery of pharmacological preparations, inflammatory and flavouring agents. This is because they have multiple

32 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/a-perspective-on-the-phytopharmaceuticals-responsible-for-the-therapeutic-applications/174135](http://www.igi-global.com/chapter/a-perspective-on-the-phytopharmaceuticals-responsible-for-the-therapeutic-applications/174135)

## Related Content

---

### Bioinformatics and Its Therapeutic Applications

Sarvesh Kumar Gupta, Kamal Kumar Chaudhary and Nidhi Mishra (2017). *Recent Advances in Drug Delivery Technology* (pp. 125-158).

[www.irma-international.org/chapter/bioinformatics-and-its-therapeutic-applications/164017](http://www.irma-international.org/chapter/bioinformatics-and-its-therapeutic-applications/164017)

### Computational Approaches for the Discovery of Novel Hepatitis C Virus NS3/4A and NS5B Inhibitors

Khac-Minh Thai, Quoc-Hiep Dong, Thi-Thanh-Lan Nguyen, Duy-Phong Le, Minh-Tri Le and Thanh-Dao Tran (2015). *Quantitative Structure-Activity Relationships in Drug Design, Predictive Toxicology, and Risk Assessment* (pp. 318-353).

[www.irma-international.org/chapter/computational-approaches-for-the-discovery-of-novel-hepatitis-c-virus-ns34a-and-ns5b-inhibitors/124474](http://www.irma-international.org/chapter/computational-approaches-for-the-discovery-of-novel-hepatitis-c-virus-ns34a-and-ns5b-inhibitors/124474)

### The "ETA" Indices in QSAR/QSPR/QSTR Research

Kunal Roy and Rudra Narayan Das (2015). *Quantitative Structure-Activity Relationships in Drug Design, Predictive Toxicology, and Risk Assessment* (pp. 48-83).

[www.irma-international.org/chapter/the-eta-indices-in-qsarqsprqstr-research/124467](http://www.irma-international.org/chapter/the-eta-indices-in-qsarqsprqstr-research/124467)

### Anti-Cancer Activities of Natural Products

Nitai Charan Giri, Bhanja Prasad Patro and Vishal Verma (2023). *Natural Products as Cancer Therapeutics* (pp. 56-105).

[www.irma-international.org/chapter/anti-cancer-activities-of-natural-products/329155](http://www.irma-international.org/chapter/anti-cancer-activities-of-natural-products/329155)

### Roles of Phytochemical Agents in the Prevention of Primary Cancer

Ayodeji Ojo Oteyola, Raffaele Pilla, Folasade Adesola Ola-Oladimeji, Omotayo Fagbuaro, Daiana Silva de Avila, Chibuisi Gideon Alimba, Erika Cristina Jorge and Fernanda R. C. L. de Almeida (2023). *Natural Products as Cancer Therapeutics* (pp. 230-253).

[www.irma-international.org/chapter/roles-of-phytochemical-agents-in-the-prevention-of-primary-cancer/329161](http://www.irma-international.org/chapter/roles-of-phytochemical-agents-in-the-prevention-of-primary-cancer/329161)