

Regular Article

Ethnomedicine to Modern Medicine: Genesis through Ages

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ABSTRACT: Ethnomedicine or natural products have encouraged several developments in drug discovery. There are many historical annals in which ethnomedicine helped to divulge navel aspects of drug isolation. Studies in ethnomedicine are the pioneer natural attempts to combat human afflictions. Their history itself witnesses how they paved their way to classic medicine. The present paper brought these all phases of medicine beginning with the ancient human knowledge to modern times. The necessity and challenges faced during drug discovery especially from ethnomedicinal plants is briefly discussed. Today, we need to have new innovative approaches for drug discovery. These are highlighted with particular emphasis on ethnomedicine.

Key words: Ethnomedicine, History, Development, Drug discovery

Introduction

The talent of mankind to learn about the natural bioresources in ambience to his advantage has, *de facto*, made humans the most successful organism on Blue Planet. This talent and ability to innovate made him possible to build material culture and find out a distinct niche and home. The desire and effort to heal ailment has gone by the name of 'medicine' in any society, whether advanced or aboriginal. Through the ages, the knowledge, practices and innovations of worldwide indigenous communities, has been turned into traditions, whether written or oral. Medicine is one such manifestation of traditions. Mashelkar (2002) opined that in real life, particularly in the developing world, there is a whole parallel knowledge based system, which is generated by people who live in the laboratory of life, based on their empirical wisdom and experience. There is an urgent need to preserve, protect and add value to it. Although, medicine initially developed from a desire within and not from any foreign impetus, it is being searched out in laboratories in modern times, away from Mother Nature. The genesis of medicine from nature to laboratory forms the subject matter of the present communication.

Development in Medicine: Some Glimpses

It is true that all human knowledge is not found within the libraries, laboratories and classrooms of academic institutions and universities. Ethnomedicinal knowledge, in particular, is associated with the indigenous or tribal people especially in a region of high biodiversity. It is an interaction with the ambient flora and is transmitted from generation to generation. Human cultures have often served as repositories of oral traditions that reflect centuries of years of accumulated experience about plant-based medicinal utilities. Following form some examples of ethnomedicinal development from different human societies or derived from myths and legends (*cf.* Cox, 2005). (a) Chinese Angelica or Dang Gui [*Angelica sinensis* (L.) Dells, Apiaceae] was / is traditionally used daily in cooking. They conceived it as a blood tonic. In modern times, it is administrated against 'deficient blood' and to improve blood circulation. (b) Visnasa or Khella [*Ammi visnaga* (L.) Lam., Apiaceae] is mentioned in the Egyptian 'Ebers Papyrus' about 1500 BC. It was traditionally used against kidney stones. Today, it is also employed to treat kidney stones. (c) Arnica [*Arnica montana* L., Asteraceae] in European folk medicines, has been extensively used. Johann Wolfgang Von Goethe (1749-1832), a poet and philosopher in Germany, drank its tea to ease his angina in old age. It is still valuable in angina and for weak or failing heart. (d) Milk Thistle [*Carduus marianus* Linn., Asteraceae] in Europe was consumed to increase breast-milk production. Its flowering heads help increase

breast-milk. (e) Cinchona [*Cinchona calisaya* Wedd., Rubiaceae] was known to a Peruvian priest, Padre Calancha (1633). Its bark was used in the form of potion to cure all kinds of fevers. In modern times, it is a well-known anti-malarial drug. (f) Peyote [*Lophophora williamsii* Coult., Cactaceae] was used by Native Americans in their religious ceremony for over 3000 years. It was used as a hallucinogen. Today, it is useful in emotional and mental state. (g) Yellow Loosestrife [*Lysimachis vulgaris* L., Primulaceae] was revealed by king Lycimachus Sicily. It is noted to staunch wounds and nosebleeds. This is also recorded by Pliny (23-79 A.D.) and Dioscorides (40-90 A. D.). Its aerial parts are used to stop bleeding and to cleanse wounds. (h) Ginseng [*Panax ginseng* C. A. Meyers, Araliaceae] is the most popular herb known over 7000 years. In written records, it is mentioned in Chinese Herbal 'Shen Nung Pen Tsao Ching' (1st Century B C). It was known for improving stamina and resistance to stress, stimulating for youngs and restorative for old age. In present times, it is administrated as adaptogenic and tonic. In China, it is used as tonic herb for athletes and sufferers of physical stress. (i) Kawa Kawa [*Piper methysticum* Forst. f., Piperaceae] is revealed by aborigines of Australia and Pacific Islands as a calming and stimulating intoxicant. It is aphrodisiac and has narcotic effect. In recent times, it is used as tonic, stimulant and to reduce anxiety. (j) Rood-bark of Jamaica Dogwood [*Piscidia erythrina* Linn., Fabaceae] was used by the native Caribs and Afro-Caribbeans to stupefy fishes. Presently, it is employed as sedative and painkiller, apart from treatment in insomnia and over excitability. (k) Rehmannia [*Rehmannia glutinosa* Libosch., Scrophulariaceae] is mentioned by Ge Hong (4th Century A. D.), a Chinese physician and alchemist as a longevity herb and very effective tonic for the liver and kidneys. These properties have been validated on modern lines. (l) Rosemans [*Rosamarinus officinalis* L., Lamiaceae] has been in use since 500 BC., in Southern Europe to improve and strengthen the memory. It was reputed as a tonic and invigorating herb. In ancient times, it was burnt in the homes especially for the students in Greece who are about to appear in examinations. Presently, it is well known for its tonic, stimulant, astringent and nervine tonic properties. These traditional uses are still in vogue. (m) Greater Burnet [*Sanguisorba officinalis* L., Rosaceae] in Europe, it has long-standing reputation as a wound healer. In China, it is also known similarly to staunch blood. Today, it is prescribed to treat heavy period and uterine haemorrhage. (n) Figwort [*Scrophularia nodosa* Linn., Scrophulariaceae]. After infection of tuberculosis, the lymph nodes of the neck swell to form hard lymph beneath the skin. Roots of this taxon resemble this condition and hence formed a remedy to treat scrofula, tumors or swellings. It is still used so in Europe, and also to heal wounds, ulcers, burns and haemorrhoids. (o) Arjuna [*Terminalia arjuna* (Roxb.) Wight and Arn., Combretaceae] was prescribed by Vagbhata (7th Century A. D.), an Indian physician, to treat heart failure and oedema. It is now validated as a cardiac tonic. It lowers blood pressure and reduces cholesterol (*cf.* Hoizey and Hoizey, 1993; Manniche, 1989; Voget, 1970; Unschuld, 1985; Patil, 2006; 2008a, b, 2010).

These age-old traditional records of esteemed remedies are the attempts by mankind to search out medicinal virtues. They have not lost their medicinal significance even during the age of great development and progress in chemistry and modern methods or remedies. On the contrary, the recent advances in medicine made them more precise. Chemists also succeeded in isolation of the pure active substances which the plants possessed. Although, synthetic

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medicines were developed in past but today they have been pushed aside. The herbal / ethnomedicine regained their lost glory.

History and Traditions in Medicine:

Medicinal applications to combat human suffering have been reflected in ancient manuscripts worldwide (see Table-I and II). The Greeks and Romans were acknowledged very well with medicinal herbs and their therapeutics. The works of Aristotle (384-322 BC.) Theophrastus (370-287 BC.), Pliny the Elder (29-79 A.D.), Dioscorides (50-100 A.D.), and Galen (131-201 A.D.) brought forth healing virtues of herbs. However, during the 'Dark Ages' (400-1000 A.D.) and 'Middle Ages' (1000-1500 A.D.), the contributions in medicine were not so notable. In India, Indian system of medicine, Ayurveda was aimed at union of physical, emotional and spiritual health and it evolved over 5000 years. The Chinese, over 6000 years, used plants as drugs. The earliest Chinese records goes to Erh-Ya (3000 BC.). The Chinese emperor Shen Nung published treatise on herbs in 2735 BC. Similarly, 'Yellow Emperor's Classic of Internal Medicine' by Huang Di Nei Jing (200 BC. To 100 A.D.) based on observations of nature and way of life. The Sumerians ideograms (4000 BC.) also referred to plant utilities. 'Ebers Papyrus' (2838 BC.) of Egypt is rich repository of medicinal knowledge. Few others are given in Table-I & III. Apart from the written records, innumerable accounts which were passed orally through centuries have been also brought forth by many workers in this field throughout the world. There are many written records are accounts on medicine. Popular folk remedies were / are prevalent throughout the world in different civilizations. Later modern periods witnessed important investigations in chemistry and rapid progress in medicine. Chemists succeeded in isolation of pure active substances from the crude drugs and have forced in commerce / trade (see Table- III & IV).

The folk medicines or ethnomedicines sometimes received biased treatment and even discarded. One must remember that these are mostly pioneer attempts or phases in the development of modern classic medicines. They should be considered cautiously and not to be rejected straight way. The possible development of medicine, in general, would be as given in Table- V. Medicines have been revealed by different methods or sources such as : (i) observations on behavior of animals, (ii) accidental / incidental fortunate / unfortunate experiences (trial and errors) of mankind in long past, (iii) divine knowledge of Seers/ Rishis and (iv) doctrine of signatures. The literature / written accounts are readily available on former three methods/ sources. However, the last one 'doctrine of signature' has been largely ignored by researchers in medicine. Its foundation was laid down by Paracelsus during 1493-1541 (*cf.* Arber, 1999; Patil, 2009). This doctrine pointed out a relation between how a plant looked, God's signature, and how it might be medicinally useful for solving health problems. The present author supported the said doctrine (*cf.* Patil, 2004, 2005, 2007, 2009, 2010) and emphasized a need for studying medicine and medicinal plants from standpoint of doctrine of signature. The studied on this line are yet remained ignored.

Drug Discovery

Drug discovery from herbs has to face many challenges. Phytochemists and pharmaceutical industries should improve both quality and quantity of compounds which enter the drug development process in view of other efforts of drug discovery. The entire process is time-consuming and costlier affair. Both time and money goes many times in vain. Lead identification is the first step. Lead optimization, inclusive of medicinal and combinational chemistry and clinical trials take their own time. There are various approaches for the drug discovery from herbs such as : (a) random

selection high chemical screening, (b) random selection followed by biological assays, (c) follow-up of biological activity reports, (d) follow-up traditional or ethnomedicinal use of plants, (e) use of proper plant parts, (f) use of a plant product, etc. Faster and better methodologies of plant collection are essential with the solutions of legal and political issues. Developments of drug from lead compounds isolated from herbs have some challenges ahead. For example, natural products are isolated in small quantities which do not suffice for lead optimization, lead development and clinical trials. Drug development process particularly from ethnomedicine begins with a plant taxonomist, ethnobotanist, ethnopharmacologist who gain data and decipher of plants species desired. This approach involves Plant Science, Chemistry and Pharmacology. This approach plays a valuable role in assessing natural products and especially herbal drugs from folkloric resources. This science constitutes the scientific backbone for developing active therapeutics based on traditional medicines different human indigenous societies. It validates the traditional preparation.

i) Quality Control: It is a critical and essential matter when one employs traditional medicine. Safety, therapeutic efficacy and rational use in healthcare must be assured. To meet these, finger printing and marker compound analysis are very useful to standardize traditional formulations of medicine. These also prove their correct botanical identity and regulate chemical purity of the plants (*cf.* Mukharjee, 2002).

ii) Quality Assurance: Good manufacturing practices particularly for herbal drug are to be carefully attended right from field cultivation, preparation of formulations such as powder, extract, pure components, etc. Moreover, the natural drugs should have one or more ingredients and harmless under specified conditions of application.

iii) Novel Approaches: In recent times, much is being discussed and addressed about value addition. This is more important in case of herbal drugs as they are directly concerned about human health. Some novel approaches of drug delivery system are essential e.g. targeted drug delivery, reduced dose, increased solubility, enhanced absorption, reduced elimination and metabolism of the drug. The targeted as well as timely release help improve the phytomolecules in view of effectiveness. This widens their application range and ensures optimal dosage. In turn, this improves cost effectiveness of the product (*cf.* Liu *et al.*, 2008).

iv) Safety: We must pay attention to public perception about safety of drugs. The modern drugs are construed dangerous owing to the side effects, while herbal ones are considered safe. However, the latter is not the always condition. They may be dangerous. The herbal drugs should be addressed by particular experience and expertise. Regularity requirements concerning safety and evolution of potential interactions between phytoconstituents and conventional medicines (*cf.* Mukharjee and Sahu, 2003). Regulatory agencies should also documents such interactions for future actions.

v) Systems Biology: This new field has emerged in biosciences. It addresses the interaction of different components within an organism to explain relevant physiological behavior and functions. This discipline focuses the dynamics of all regulatory, genetic and metabolic processes in a cell and reveals the intricacies of cellular networks (*cf.* Kitano, 2002). This approach may be more effective when medicinal plant has known evidence.

Table I: Worldwide Ancient Literature: Sources of Information

1.	Badianus Manuscript (1552)	Plants used by Maya and Aztec people of America
2.	Dioscorides' Materia Medica (40-90 A.D.)	European countries
3.	Ebers Papyrus (About 1500 BC.)	Italy
4.	Irish Herbal By K'Eogh (1735)	Ireland
5.	Divine Husbandman's Classic (Shen'nong Benacaojing (1 st Century A.D.)	China
6.	The Physicians of Myddfai (13 th Century)	Welsh Herbal
7.	Tang Materia Medica (659 A.D.)	China
8.	The English Physitian (By Nicholas Culpeper) (1652)	England
9.	The Herball (By Gerard John) (1597)	Europe
10.	Writings of St. Hildegard of Bingen (12 th Century)	Europe
11.	Grandfather Lei's Discussion of Herb Preparations (490 A.D.)	China
12.	Code Humnurabi (4000 years ago)	Europe
13.	Pent-S'ao (By Emperor Shah Nung) (2700 BC.)	China

Table II: Indian Ancient Literature: Sources of Information

1.	Colloquios dos simples e drogas e cousas medicinal da India (By Garcia da Orta) (1563)	Goa
2.	Tracado de las drogas medicinas de las Indias Orientalis (By Christobal Acosta) (1578)	South India
3.	Hortus Malabaricus (12 Volumes) (By H.A. Van Rheede) (1676-1693)	Cochin, Kerala
4.	A Dictionary of Economic Products of India (6 Volumes) (By Watt George) (1889-1893)	Indian Region
5.	Flora Indica (3 Volumes) (Roxburgh William) (1832)	Indian Region
6.	Vedic Period : i) Rigveda (4000-1500 BC) ii) Atharvaveda. Post-Vedic Period : i) Charak Samhita By Charaka (100 A.D.) ii) Sushruta Samhita By Shrushta (800-900 A.D.) iii) Ashtanga Haridiyam Samhita By Vagbhatta (700 A.D.) iv) Shadal Nighantu By Shodeal (1200 A.D.) v) Raj Nighantu By Narhari (1600 A. D.)	Indian Region

Table III: Compounds in Modern Medicine from Ethnomedicinal Leads

Sr. No.	Compound	Source	Use/ Indication
1.	Viscine, Viscinose	<i>Adhatoda zeylanica</i>	Bronchodilator, Stimulant
2.	Atropine, Hyoscine Hyosciamine	<i>Atropa baladona, A. acuminata</i>	Anticholinergic
3.	Vincristine, Vinblastine	<i>Catharanthus roseus</i>	Anticancer, Hypertensive, Hypoglycaemic
4.	Quinine	<i>Cinchona spp.</i>	Antimalarial
5.	Reserpine, Serpentine	<i>Rauvolfia serpentina</i>	Hypotensive, Sedative
6.	Solasidine	<i>Solanum khasianum</i>	Cortisone, Steroidalhormone
7.	Guggulu	<i>Commiphora mukul</i>	Gout, Rheumatism, Arthritis
8.	Diosgenin	<i>Dioscorea spp.</i>	Anti-inflammatory, Antifertility
9.	Morphine	<i>Papaver somniferum</i>	Sedative

10.	Kutkin, Picrorhizin	<i>Picrorhiza kurroa</i>	Tonic, Stomachic, Cathartic
11.	Digitoxin, Gitalin	<i>Digitalis purpurea</i>	Heart disease
12.	Ephedrine	<i>Ephedra spp.</i>	Bronchodilator
13.	Berberine	<i>Berberis spp.</i>	Antibacterial
14.	Podophyllotoxin	<i>Podophyllum hexandrum</i>	Anticancer
15.	Emitine	<i>Cephalis ipecacuanha</i>	Emetic

Table IV: Drug Commercialization from Ethnomedicinal Sources

Sr. No.	Drug	Important Plants	Indications
1.	Mentat (Him. Drug. Co.)	<i>Bacopa monnieri</i>	Mind activator
2.	Pilex (Him. Drug. Co.)	<i>Vitex negundo</i>	Panic, inflamed, bleeding piles
3.	Liv-52 (Him. Drug. Co.)	<i>Andrographis paniculata</i>	Liver tonic
4.	Cystone (Him. Drug. Co.)	<i>Saxifraga lugulata</i>	Urinary stone
5.	Diarex (Him. Drug. Co.)	<i>Holarrhena antidysenterica</i>	Diarrhoea
6.	Medigasone (Med. Products Ltd.)	<i>Terminalia chebula, Zingiber officinale, Emblica officinalis, Cuminum cyminum</i>	Digestive disorder
7.	Medipurine (Med. Products Ltd.)	<i>Rubia cordifolia, Azadirachta indica</i>	Blood purifier
8.	Medimentoram (Med. Products Ltd.)	<i>Centella asiatica, Bacopa monnieri</i>	Brain tonic
9.	Kasni (Maharshi y. Ltd)	<i>Justicia adhatoda zeylanica</i>	Cough syrup
10.	Livosin (Jupier Pharma Ltd.)	<i>Andrographis paniculata</i>	Hepatoprotective
11.	Livomyn (Charak Pharma)	<i>Andrographis paniculata, Solanum nigrum</i>	Hepatoprotective
12.	Muktavati (Divya Pharma)	<i>Convolvulus pluricaulis, Centella asiatica</i>	Hypertension
13.	Mimbolin (Amar Chemicals)	<i>Azadirachta indica</i>	Bleeding piles
14.	Carimnozyme (Jupiter Pharma Ltd.)	<i>Boerhavia diffusa</i>	Digestive disorders
15.	La-Vini (Jenburkt Pharma Ltd.)	<i>Ficus benghalensis</i>	Antifertility, Aphrodisiac agent
16.	Alpha-Coff (Dr. Willmar Schwabe Pvt. Ltd.)	<i>Justicia adhatoda, Rumex crispus</i>	Cough syrup
17.	Payokil (Gurukul Kangri Pharmacy)	<i>Acacia arabica</i>	Pyrrhoea, Bleeding toothache
18.	Zigliv (Ankerite-Health Care Pvt. Ltd.)	<i>Boerhavia diffusa, Solanum nigrum, Eclipta alba</i>	Hepatoprotective, Hepatoregenerative

Table V: Development in Medicine: A Comparison
Ethnomedicine (Folk Medicine) ⇒ Organized Systems of Medicine ⇒ Modern Medicine

1.	Ethnomedicine	- Methods rather curde - No chemical explanation - Trial and errors.
2.	Organized systems of medicine (Ayurveda, Unani, Siddha, Chinese, Tibetan, Kampo, Homeopathy, etc.)	- Methodological - Properties of drugs decided - May have or without chemical explanation - Well thought theories / principles
3.	Modern Medicine	- Methodological - Clear chemical explanation - Proved by biological activities and clinical trials.

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