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The Promise of Traditional Medicines

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Abstract: The usage of plants, plant extracts or plant-derived pure chemicals to treat disease become a therapeutic modality, which has stood the test of time. Today several pharmacological classes of drugs include a natural product prototype. Aspirin, atropine, ephedrine, digoxin, morphine, quinine, reserpine and tubocurarine are a few examples of modern drugs, which were originally discovered through the study of traditional cures and folk knowledge of indigenous people. A team work amongst ethnobotanists, ethnopharmacologists, physicians and phytochemists is must for the fruitful outcome on medicinal plants research. While the ethnopharmacologists have a greater role in the rationalization of combination of activities, the phytochemist's role will slightly shift towards standardization of herbal medicines.

Key words: Traditional medicines, herbal drugs, plant-derived modern drugs, synergistic and/or side-effects nullifying combinations

INTRODUCTION

Traditional or herbal medicine is in an evolutionary process as communities and individuals continue to discover new techniques that can transform practices in the field of medical sciences. Traditional medicine and drug discovery using natural products still important issues in the current target-rich, lead-poor scenario (Patwardhan *et al*., 2004).

According to the World Health Organization (WHO), about three-quarters of the world population depends upon traditional remedies (mainly herbs) for the health care of its people. In fact, herbs/plants are the oldest friends of human being. They not only provided food and shelter but also served the humanity to cure different dysfunctions. The traditional medicines also sometime called as, herbal or natural medicine existed in one way or another in different cultures/civilizations, such as Egyptians, Western, Chinese, Kampo (Japan) and Greco-Arab or Unani/Tibb (South Asia). Historians from all around the world have produced evidence to show that apparently all primitive peoples used plants often in a sophisticated way. Quinine from Cinchona bark was used to manage the symptoms of malaria long before the disease was identified and the raw ingredients of a common or garden aspirin tablet have been a popular painkiller for far longer than we have had access to tablet-making machinery. By the middle of the nineteenth century at least 80% of all medicines were derived from plants. Then came the revolution inspired by the development of the pharmaceutical industry and synthetic drugs dominated, though traditional medicine has never been out of scene. Even today if you visit to any pharmacy in the West, you will find at least 25% plant derived drugs. Moreover today many pharmacological classes of drugs include a natural product prototype (Gilani *et al*., 1992).

Traditional medicines have given us very useful synthetic clues of modern drugs in the past (Table 1) (Gregory, 2004). Most of these plant-derived drugs were originally discovered through the study of herbal cures and folk knowledge of traditional people and some of these could not be substituted despite the enormous advancement in synthetic chemistry (Gilani *et al*., 1998).

Herbal products are also commonly used patients with certain chronic medical dysfunctions, including breast cancer (12%), liver disease (21%), human immunodeficiency virus (22%), asthma (24%) and rheumatological disorders (26%) (Inamdar *et al*., 2008). A lot of traditional medicines have been reported with different pharmacological actions (Table 2) (Gregory, 2004).

Traditional medicine safety and standards: Figure 1 a flow chart for the study of plants used in traditional medicine , the most important feature of all health care is to do no harm (Oath of Maimonides); assuring that whatever is being taken by humans for medicinal purposes is safe. Effectiveness is a secondary consideration. Many users of herbal medicines consider

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Table 1: Few examples of plant-derived modem drugs

Active ingredients	Botanical source
Aspirin	Willow bark
Atropine	Belladonna
Capsaicin	Pepper plant
Colchicine	Autumn crocus
Digitalis	Fox glove
Morphine	Opium poppy
Pilocarpine	Jaborandi tree
Podophyllin	Mayapple root
Quinine	Chinchona bark
Reserpine	Indian snake root
Taxol	Pacific yew tree bark
Vincristine, vinblastine	Madagaskar periwinkle

Table 2: Examples of well known herbs and their proposed pharmacological actions

Herb	Principal Indication
Aloe vera	Topical use for burus and skin irritation
Bearberry	Urinary tract infection
Bilberry	Visual and circulatory problems
Boldo	Digestive disorder
Butcher's broom (Ruscus)	Vein disorders
Cascara sagrada	Laxative
Cat's-claw	Inflammatory conditions (little evidence)
Chamomile	Digestive disorder
Chaste tree	Menstrual disorder
Dong quai (*Angelica sinensis*)	Gynaecological disorders (little evidence)
Evening primrose	Eczema, mastalgia
Ginger	Motion sickness, Antiemetic
Golden seal	Anti-infective (toxic at higher dose)
Gotu kola (Indian pennywort)	Mental fatigue
Green tea	Antioxidant (cancer and heart disease prevention)
Hawthoru	Mild heart failure, BP reduction
Horse chest nut seed	Varicose veins
Licorice	Demulcent, peptic ulcer (high doses elevate BP)
Mistletoe	Anticancer agent (scant evidence, potential toxicity)
Pau d'arco	Multiple chronic conditions (scant evidence)
Senna	Laxative
Skullcap	Immune system support
Slippery elm	Demulcent, coughs
Tea tree oil (Melaleuca)	Skin infections
Turmeric	Antioxidant, antiinflammatory
Valerian	Sleep disorders
Wild yam (Dioscorea)	Menopause symptoms; does not supply progesterone

that they are safe for human consumption; an assumption based, in part, on extensive prior field experience. If this concept ever had validity, it is now no longer correct. In different parts of the world, phytotherapeutical products are frequently used with over-the-counter (OTC) and prescription products (Anonymous, 2000).

Various formulations of traditional drugs are available in the market Worldwide (Table 3). In the US market, tablet and capsule formulations the famous one, while overseas, teas or infusions of herbs are the most popular (Gregory, 2004). The WHO has issued a set of some guidelines for the study of traditional medicines

Table 3: List of traditional drug formulations

Formulation	Means of preparation
Infusion	Near-boiling water on herb for 5-10 min
Tea	Infusion of aromatic herbs
Decoction	Simmer herbs for 15 min, then strain
Maceration	Steep herb in room-temperature water
Fluid extract	1 part herb to 1 part ethyl alcohol
Glycerine extract	Steep herb in glycerine-water mix
Juice	Juice expressed by crushing herb
Inhalation	Breathe in vapour from heated herb mix
Oil	Steep herb in olive or other plant oil
Ointment	Herb salve made with lanolin or bees wax
Lozenge	Herb preparation that dissolves in the mouth
Powder	Dried powdered herb
Tablet	Compressed herb material in pill form
Capsule	Encapsulated herbal material
Syrup	Concentrated sugar solution to preserve infusion
Compress	Cloth soaked in herbal solution
Poultice	Application of herbal paste

(Anonymous, 2000). On a batch-to-batch basis there must be botanical, chemical and biological standardization of products and collateral studies which would establish both the safety of the product and a demonstration of its efficacy and meaningful shelf-life. Real time PCR (polymerase chain reaction) analysis on a microchip will become a standard procedure for the authentication of phytotherapeutic constituents (Carles *et al*., 2001). Multi component analytical systems will have a significant stress in the area of routine chemical standardization. Quick, cheap, accurate and clinically relevant biological systems, usually microarray-based, will demonstrate (verify) the level of biological activity for each batch of marketable product (Prasad *et al*., 2005).

Synergistic (side-effects nullifying) combinations in plants: The presence of synergistic and/or side-effects neutralizing combinations in medicinal plants is a long-established concept put forth by the Hippocrates and strengthened by Ibn Sina and others; however, this concept remained dormant and lacks sufficient scientific evidence mainly due to scarcity of ethnopharmacologists with wider background (Gilani *et al*., 2000, 2005c).

An alternate approach to bring about cholinergic effect is through inhibition of an endogenous enzyme (ACE), responsible for the breakdown of endogenous Ach, thus making availability of enhanced level of Ach at the desired site, as is the case for the use of ACE inhibitors in myasthenia gravis, senile dementia and Alzheimer's Disease (AD). ACE inhibitor potential has been reported in medicinal plants (Rahman and Choudhary, 2001; Khalid *et al*., 2004; Gilani *et al*., 2004, 2005a) and thus provided scientific basis for some of the traditional uses of the respective medicinal plants.

Khalid *et al*. (2004) and Gilani *et al*. (2005a) reported the presence of a unique combination of activities

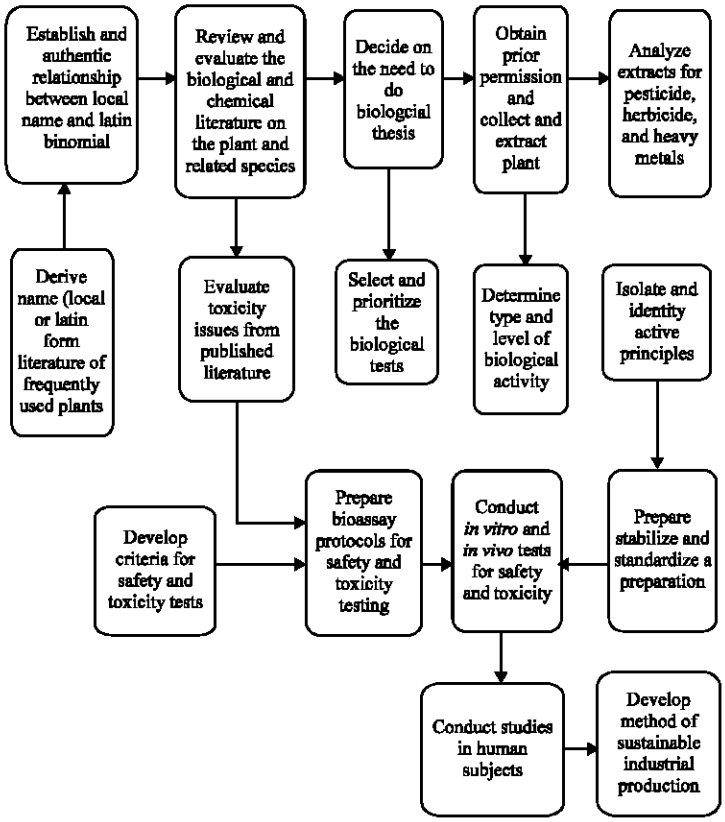

Fig. 1: A flow chart for the study of plants used in traditional medicine

(ACE inhibitory and calcium antagonist) in *Sarcococca saligna* with active chemicals identified Similarly, juliflorine from *Prosopis juliflora* and Withanolides from *Withania somnifera* were found to possess this special combination of activities (Choudhary *et al*., 2005a, b). Turmeric (rhizome of *Curcuma longa*) has been traditionally used as antispasmodic and bronchodilator along with other multiple uses (Gilani *et al*., 2005b). St. John's Wort (*Hypericum perforatum)* is a well known botanical having already being used for mild to moderate depression and its antidepressant actions are said to be mediated through multiple modes, such as inhibition of monoamine oxidase, catechol-o-methyltransferase and dopamine hydroxylase (Thiede and Walper, 1994; Kleber *et al*., 1999; Ron *et al*., 2000), by blocking synaptic reuptake of 5-HT (5-hydroxy tryptamine), nor adrenaline, dopamine, GABA (Gamma Amino Butyric Acid) and L-glutamate (Muller, 2003), inhibiting nitric oxide synthetase (Luo *et al*., 2004) .

These examples indicate that the herbs in their crude form show interesting combination of activities and there is a huge potential of medicinal plants not only as a source of new drugs but also their use in the form of botanicals both in developing countries and the industrialized world.

If humanity is going to survive, let alone continue to evolve, major shifts in the consumption of renewable versus non renewable resources are required. What we must strive for is an open vision of the ways in which current resources and technologies and those to be developed, can be utilized most favourably for the future health care. We must develop and continually reaffirm a vision that, few decades (30-40 years) from now, for some of the reasons outlined above, that there will be a well defined requirement for safe, effective, standardized and sustainable natural products in global health care (Cordell, 2000, 2004; Cordell *et al*., 2001). There must be a willingness on both sides, those who have the resources and those who wish to assist in the investigation and potential development of those resources, to initiate and maintain innovative agreements for the training of local personnel, for the establishment of local herbaria and research laboratories and for the distribution of royalty and licensing income (Soejarto *et al*., 2002).

Future impact: The time has come to now to evaluate what the future impact of natural products must be in global health care as single agent drugs and as

standardized traditional medicines. Nearly 5750 different natural product skeletal, from the perspective of interactions with enzymes and receptors, represent substantially greater chemical diversity space and is more reflective of the chemical diversity space of drugs, as compare to the known range of combinatorial compounds (Feher and Schmidt, 2003).

Comparatively, there are relatively limited numbers of natural products and of those, very few have been given even cursory biological evaluation (Cordell *et al*., 2001). While considering the development of single drug agents, one could make the case for enhanced structure diversification through a number of pathways including combinatorial chemistry, combinatorial biosynthesis, chemistry on plant extracts, find alternative, previously untapped sources (e.g., endophytic fungi, extremophile microbes, or those difficult to culture. There is the future potential of having available the full biosynthetic capacity of an organism, rather than only that present at a particular point in time. Genetically controlling natural product biosynthesis is challenging at the core of enhancing the consistent availability of biologically significant natural products, either as single agents or as a multiple component mixtures (Cordell, 2004). If plants are to be effective and reproducible factories for the production of medicinal agents for whole world, the molecular switches which command the overall pathway and the specific enzymes involved in secondary metabolite formation, must be profoundly clear and understood (Boonstra *et al*., 2001). Biocatalysis, using isolated enzyme systems is another criterion to improve natural product structural diversity and to conduct reactions which have no parallel in organic synthesis (Rathbone *et al*., 2002). Approximately 21,200 alkaloids, 76% have never been evaluated in a single bioassay (Cordell *et al*., 2001).

CONCLUSION

We should continually evolve the vision of the role of traditional medicine and the natural product sciences for the future, when the pressures on available resources, including land use, water and oil, will be quite different. We should completely integrate all of the available technologies into developing the societal role of traditional medicine in global health care. It is duty to create these visions and maintain them for the creative growth of the health care of individuals and for the security and stability of societies. The future of traditional medicine needs that you be a visionary global scientist. Innovative strategies employing all of the associated sciences and technologies must be created in order that the natural product sciences, including traditional medicine, can help in the development, in a sustainable manner, of the foods and the health care products, including drugs, for a dramatically expanding worldwide population. Finally, we must promote the development of multidisciplinary, international, collaborative research programs which will encourage the local and global scientific development of our natural resources. A team work amongst ethnobotanists, ethnopharmacologists, physicians and phytochemists is must for the fruitful outcome on medicinal plants research. While the ethnopharmacologists have a greater role in the rationalization of combination of activities, the phytochemist's role will slightly shift towards standardization of herbal medicines.

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