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 flowchart 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 modern drugs

<table>
<thead>
<tr>
<th>Active ingredients</th>
<th>Botanical source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Willow bark</td>
</tr>
<tr>
<td>Atropine</td>
<td>Belladonna</td>
</tr>
<tr>
<td>Capsaicin</td>
<td>Pepper plant</td>
</tr>
<tr>
<td>Colchicine</td>
<td>Autumn crocus</td>
</tr>
<tr>
<td>Digitalis</td>
<td>Fox glove</td>
</tr>
<tr>
<td>Morphine</td>
<td>Opium poppy</td>
</tr>
<tr>
<td>Pilocarpine</td>
<td>Jaborandi tree</td>
</tr>
<tr>
<td>Pedophyllin</td>
<td>Mayapple root</td>
</tr>
<tr>
<td>Quinine</td>
<td>Chininosa bark</td>
</tr>
<tr>
<td>Reserpine</td>
<td>Indian snake root</td>
</tr>
<tr>
<td>Taxol</td>
<td>Pacific yew tree bark</td>
</tr>
<tr>
<td>Vincaistine, vinblastine</td>
<td>Madagascar periwinkle</td>
</tr>
</tbody>
</table>

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

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

Table 3: List of traditional drug formulations

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

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 (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 (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 575 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 
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