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The role of community in discovery of new drugs from herbal medicines

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ABSTRACT

Medicinal plants are a good source of new drugs. An important approach in developing a new drug from medicinal plants is to examine scientifically the usage claimed in traditional medicine. Using medicinal plants throughout centuries provided valuable information that will be critical when they are evaluating as new drugs, because, the judgment on the efficacy and safety of a specific drug can rarely be found in the results of the scientific studies. In contrast, the scientific information published on toxicity and efficacy of a particular plant, resulted from some studies, together with the anecdotal evidence, can help whether it might be acceptable for medicinal use.

Implication for health policy/practice/research/medical education:
Consumption of medicinal plants throughout centuries has provided valuable information that will be critical when they are evaluating as new drugs. An important approach in developing a new drug from medicinal plants is to examine scientifically its usage claimed in traditional medicine. The scientific information published on toxicity and efficacy of a particular plant together with the anecdotal evidence, can help whether or not it might be acceptable for medicinal use

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Introduction

World Health Organization (WHO) has estimated more than 80% of people in developing countries rely on medicinal plants or their components for the primary health care needs. Plant-derived drugs in developed countries are also of the great importance. For instance, from 1960 to 1980 more than 25% of prescriptions in the United States of America, contained plant derived extracts, which the rate has increasing trend, dramatically (1). However there is no interest in pharmaceutical companies in the United States and most of other developed countries, except Japan and China, to investigate plants as sources of new drugs. The pathway should be opened for scientists in all countries to implement research programs for the further utilization and safety of these drugs. These sources of drugs are available because medicinal plants are in abundance in most countries and can provide stable, safe, and effective products for use or/and discovery of new plant-derived drugs (2).

It should be noted that an important approach in developing a new drug from herbal medicines is to examine scientifically the uses claimed in traditional medicine. Herbal medicines naturally occur in most of countries, and people who have used them since ancient times possess valuable information from these plants. This information is critical when they are evaluated as new drugs, because, the judgment on the efficacy and safety of a specific drug can rarely be on the results of one or a couple of studies. In contrast, the scientific information published about the toxicity and efficacy of a particular plant, resulted from some studies, together with the information achieved from the people who have used it for centuries, can help in deciding whether or not it might be considered acceptable for medicinal use (3).

The fairly high percent of useful plant derived drugs is due to scientific follow-up of well-known plants which

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have been used in traditional medicine, and can be a good approach for discovery of other new drugs from herbal medicines. In contrast, other approaches, such as biological screening of randomly selected plants, phytochemical screening, or phytochemical examination of medicinal plants with the purpose of identifying new useful compounds have not been helpful in discovery of new drugs (3).

One more important question should be considered before conducting a scientific research on plants used in traditional medicine. Is it preferable to start effort for discovery of pure compounds in order to use them as drugs per se or is it desirable to go on using the traditional forms?

The programs for drug discovery should be focused on the initial need to produce effective and safe galenical products. There are critics about the use of a galenical product instead of a pure active component. In this regard the following example might be helpful in illustrating the value of a galenical preparation. The tincture of Atropa belladonna has a therapeutic efficacy at least equivalent to that of a standard dose of atropine sulfate (the main active ingredient of Atropa belladonna), in the treatment of stomach ulcer. Atropa belladonna can be cultivated easily in various countries and the manufacture of a standardized tincture would be easy and cheap, in comparison to imported tablets of atropine sulfate (3).

Another important thing which should be considered in deciding to use whole plant extract or trying to prepare a specific component of the extract is the plant antioxidant activity. There is an inverse correlation between the intake of grains, fruits, and vegetables and induction of diseases in humans including diabetes, atherosclerosis, cancer, amnesia, renal toxicity and hepatotoxicity (4). Most of these effects have been attributed to their antioxidant activities. Antioxidants are components that delay, prevent or remove oxidative damage to target molecules. However, pro-oxidant hazards of them should be considered, too (4). Oxidation is a chemical reaction which transfers electrons or hydrogen from a donor to an recipient. Oxidation reactions are crucial for life, however, they might damage to body components, including deoxyribonucleic acid, proteins, and lipids too (5).

Plants and animals have complex systems of antioxidants such as glutathione, vitamins A, C and E, as well as enzymes such as superoxide dismutase, catalase and various peroxidases (5).

Large clinical trials which have been done recently, suggested no benefit and even sometimes harmful. From the literature review it might be concluded that the diets (fruits and vegetables) or extracts high in antioxidants are nearly almost beneficial, but this is not the case for a specific component of the extract. The possible explanation is that, the plant extracts or fruits possess a combination of antioxidants. This combination of antioxidants may work as a continuous chain, while supplementation with one antioxidant cannot do as a chain. In this regard, it should be noted that after scavenging free radicals, if an antioxidant is not restored by the following antioxidant in the chain, it usually began to become a pro-oxidant. In this situation, the final effect would be no effect or a damaging effect (4). Therefore, the beneficial effects should be considered before starting to research on plants used in traditional medicine for preparation and use of its pure compound.

Authors' contributions

All the authors wrote the manuscript equally.

Conflict of interests

The authors declared no competing interests.

Ethical considerations

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