East and Central African Journal of Pharmaceutical Sciences
Vol. 24 (2021) 90-91

EDITORIAL
SHOULD WE STUDY PLANT EXTRACTS OR PURE COMPOUNDS?

Man has used herbal medicines from time immemorial to manage or prevent different ailments. Ethnomedicine continues to leverage on this practice to develop conventional medicines. Consequently, nature has contributed immensely to our existing arsenal of drugs. Many widely used medicines such as morphine, quinine, artemisinin, aspirin, taxol, atropine and emetine are derived from nature either directly or through semi-synthesis. Additionally, compounds derived from plant or animal sources have served as lead compounds and inspired the development of clinically useful molecules such as captopril and other angiotensin converting enzyme inhibitors.

There is a continuous push to integrate herbal medicine with mainstream medical practice in most parts of the world. In China and India, this integration appears to be more successful than in other parts of the world. This success may be attributed to the documented use of herbal medicine over time, including the availability of herbal pharmacopoeias. In Africa where documentation has been scarce and the practice is often mingled with rituals and traditions, there is some resistance by conventional medical practitioners and patients to accept these medicines. However, with the widespread belief that herbal medicines may be safer than conventional medicines, the former are gaining more acceptance and attention. Furthermore, claims that herbal medicines may be more effective, and sometimes curative, in the management of chronic diseases including cancers, cardiovascular diseases and HIV/AIDS are attracting patients who feel that they have nothing to lose by trying these remedies.

A case in point that illustrates the potential and pitfalls of herbal medicine in Africa is the famous Loliondo concoction. In 2010, a herbalist based in Loliondo in northern Tanzania claimed to have received, in a dream, a herbal formula that could heal all diseases, including HIV/AIDS. According to him, patients only had to take one cupful of the concoction to get cured. This information spread rapidly throughout East Africa and millions travelled and camped in Loliondo to receive the new-found ‘panacea’. Unfortunately, there were no reports of people healed from ingesting the preparation.

Incidents like these underpin the imperative for scientific study into the safety and efficacy of traditional herbal medicines. In this issue of the journal, Mukungu *et al.* report the identification of antimalarial compounds in *Leucas calostachys*, a plant traditionally used to manage various ailments, including malaria, in Western Kenya. Akinlolu *et al.* also found *Moringa oleifera* and *Musa sapientum* extracts to possess *in vivo* anticancer and hepatoprotective properties. The two plants were widely used in traditional medicine and are currently marketed as supplements for health promotion. Studies like these not only lend credence to the claims by traditional practitioners but also form a basis for further investigation aimed at harnessing the medicinal utility of these plants.

The immediate question that follows is whether to use whole plant extracts or to isolate and study individual compounds. Advances in chromatography and spectroscopy have made isolation and identification of pure compounds relatively facile. Indeed, phytochemistry is now an established branch of chemistry. One of the major advantages of isolating and testing pure compounds is that one is able to tell unequivocally which molecules are active and which ones are not. This information will either produce a compound that can directly be advanced in drug development, or one that can serve as a basis

for the development of molecules with improved pharmacokinetic and efficacy profiles. The molecules isolated can form a library that may be subjected to many different assays instead of just focusing on the traditional use. Even when not found active, the identified molecules may be used as marker compounds for the standardization of whole plant extracts.

However, it is also important to study whole plant extracts, and sometimes even mixtures of extracts. There are many reasons for this. Firstly, it is possible that the various compounds in the extract(s) act synergistically to combat a particular ailment. Isolation and use of one compound thus interferes with this synergy. Secondly, especially for infectious diseases, the presence of many compounds that may have different mechanisms and durations of action may slow down the spread of antimicrobial resistance. For example, *Artemisia annua* has been used for centuries but antimalarial resistance was reported within a few decades of artemisinin use. Thirdly, herbal mixtures tend to target many different conditions at once. For instance, the same herbal remedy can treat infections, lower blood pressure and reduce blood sugar levels. This reflects the usual clinical presentation in many patients and leads to polypharmacy in conventional patient management. Fourthly, there are encouraging reports that herbal remedies may reverse damage caused by some chronic disease states. While many conventional medicines may be effective in treating the immediate presentation of a particular disease, they do not generally reverse the effects of the disease. In this respect, oral hypoglycemic agents usually lower blood sugar levels but have no effect on vascular damage caused by diabetes in different body organs.

Thus it is beneficial to study both pure isolated compounds and whole extracts in parallel. Integration of conventional and herbal medicines should not be a matter of debate. The focus should be on how best to reap the benefits of advances in modern medicine while also harnessing the potential of traditional herbal medicine to benefit the patient.

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