A REVIEW-USE EFFICACY AND TOXICITY OF LOCAL HERBS AS ETHNO MEDICINES AGAINST MALARIA

SANTOSH KRISHNANAND DUBEY, DR. DEEPAK KUMAR MITTAL
Research Scholar, SSSUTMS, SEHORE, MP
Research Guide, SSSUTMS, SEHORE, MP

Abstract

The problem of malaria resistance caused by parasites against current medicines or by malaria against pesticides has prompted countries to focus attention on conducting new research to develop new medicines for new pesticides. The world seems to be rediscovering the importance of traditional medicines, and people are turning to the use of traditional medicines under different names, such as alternative medicines or complementary and alternative medicines (CAMs). The suffering and economic hardship of malaria in endemic areas requires extensive research and development as well as the development of effective and safe malaria drugs.

Keywords: Medicinal plants, Pharmacokinetics, Clinico-Pathological, Crenulate

Introduction

The World Health Organization has defined traditional medicine as the entire combination of knowledge and practices that is explicable or not used to diagnose, prevent, or eradicate physical, mental, and social illnesses that are based solely on past experiences of generation transmitted to generation orally or in writing (WHO, 2001a). Traditional medicine has a long history of use. It has existed for centuries and has grown in all communities to meet the challenge of maintaining health and treating diseases worldwide. Bannerman (1993) found that traditional medicine meets the health needs of more than 40% of the African population. The most popular antimalarial drugs come from plants such as Cinchona bark quinine and Artemisiaannua artemisinin (WHO, 2001a).

According to the WHO-Kobe report (WHO, 2001a), there was no fair access to healthcare in Africa. Only half of the population in the region has access to formal health care. Because of this inequality, traditional medicine was the only medical care, especially for poor patients. On the other hand, even if western health care facilities are available, traditional medicine is considered an effective, culturally acceptable form of treatment, and treatment with herbal products has treated even incurable diseases. , In Ghana, Kenya and Mali, research has shown that a pyremetamine sulfadoxine cycle costs several dollars, while total spending on health

spending in Kenya and Ghana was only $ 6 per capita per year. In essence, some populations simply can not afford chemical drugs. In Benin and Sudan, a World Bank poverty analysis found that 70% of people are dependent on traditional medicine. Similarly, a household survey in Mali, Ghana, Nigeria and Zambia found that 60% of children with fever at home were treated with herbal medicines (UNICEF, 1998).

Literature Review

Herbal medicine as a component of Traditional medicine is widely practiced in Kenya, where this has been documented by ethno-botanical surveys. Moreover, herbal medicines are an important part of the culture and traditions of the African people. In addition, they are a preserve of the cultural heritage, ethno-pharmacological base for drug discovery and biological diversity. On the other hand, many rural areas have few health centers, and where they are, some are poorly equipped with personnel and medicine and so people turn to traditional medicine.

Herbal medicine tends to look primitive and unscientific when compared to synthetic (conventional) drugs which are thought to be more reliable than those made from plants. Herbal medicine is still the mainstay of about 75-80% of the World population mainly in the developing countries for primary health care. This is primarily because of the general belief that herbal drugs are without any side effects, cheap and locally available. The use of plants for healing purposes predates human history and forms the origin of much modern medicine. Many synthetic drugs originated from plant sources: a century ago, most of the few effective drugs were plant based. Examples include: Aspirin (a chemical copy of the analgensic chemical in the bark of Willow trees), digoxin (from Fox glove), quinine (from the bark of various Cinchona tree species which was used in the treatment of Malaria) and Morphine (from the opium poppy).

Toxicology and safety of medicinal plants

Bioactive compounds are almost always toxic in high doses. The basic premise here is that, pharmacology is toxicology at a higher dose and toxicology is pharmacology at a lower dose. However, plants used in traditional medicine are assumed to be safe based on their long usage according to knowledge accumulated over centuries (Fennell *et al.*, 2004). Scientific research has shown that many plants used as food or in traditional medicine are potentially toxic, mutagenic and carcinogenic (Schimmer *et al.*, 1994; Kassie *et al.*, 1996; De Sa Ferrira and Ferrao, 1999). Poisoning from traditional medicine is usually a consequence of misidentification, incorrect preparation or inappropriate administration and dosage (Stewart and Steenkamp, 2000), and frequently due to self-administration (Popat *et al.*, 2001). Furthermore, some interactions between

herbal and conventional drugs when taken together could alter their pharmacokinetics and result in short or long term undesirable outcomes (Chen *et al.*, 2011; Hu *et al.*, 2005; Izzo *et al*; 2009; Tsai *et al.* 2012).

Highly trained traditional medicine practitioners possess considerable knowledge of medicinal plants and how to avoid acute poisoning (Savage and Hutchings, 1987). However, a growing number of healers do not possess formal training or sufficient knowledge, skill and experience to practice successfully (Bodenstein, 1973). In addition, many potentially toxic plants remedies are available over the counter from herbalist retailers and medicinal plant traders without regulation (Bodenstein, 1973; Cunningham, 1988; Popat *et al.*, 2001). Substitution of plants from the same family is common and especially so with bark products (Grace *et al.*, 2002). Purposeful adulteration by unscrupulous healers and traders of traditional medicine is also not uncommon (Cunningham, 1988; Manana and Eloff, 2001; Monteiro, 2008).

Acute toxicity test is the single most important test carried out on chemicals of biological interest (Loomis, 1978). The test involves the single dose administration of the chemical in question with a purpose of determining the consequent symptomatology and lethality. Median lethal dose (LD50) is the least dosage of any substance that is expected to kill half of the exposed population. There are guidelines for conducting such tests in laboratory animals. Suba cute toxicity and chronic studies are tests that are carried out for up to three months and beyond respectively. In addition to the observation of clinical symptoms, organ function tests are done to assess possible damage and finally postmortem lesions are observed in case of death or euthanasia. A routine procedure in live animals is the clinico-pathological assessment and testing. Hematology, liver and kidney function tests are the most frequently performed, and are usually closely correlated with both the clinical and histo-pathological findings (Kaneko *et al.*, 1997; Cornelius, 1987).

Significance of Toxicity studies

Many plants produce toxic secondary metabolites as natural defense from adverse conditions. These secondary metabolites have served as useful leads in developing drugs for human consumption. Some of the phytochemicals produced by plants against herbivorous insects also end up being harmful to humans, because highly conserved biological similarities are shared between both taxa as seen in most pathways involving protein, nucleic acid, carbohydrate and lipid metabolism. Another implication in the toxicity of certain herbs is the presence of toxic minerals and heavy metals like mercury, arsenic, lead and cadmium. Lead and mercury can cause serious neurological impairment when a herbal medicinal product contaminated with these metals is ingested. In view of the increasing consumption of medicinal plants as alternative therapy, it is necessary to carry out toxicity studies to ensure that the plants are safe for human consumption.

***Zanthoxylum chalybeum* Engl.(Rutaceae)**

Figure 1: *Zanthoxylum chalybeum* shrub

Taxonomic description

Zanthoxylum chalybeum is a deciduous spiny shrub or tree that may stand at 1.5 – 10 m tall. It is commonly found in semi-evergreen or dry forests, wooded grasslands and in coastal thickets near the sea. The trunk is furrowed with corky knobs or ridges crowned with spines. The bark is pale grey; smooth dark with scales and prickles. The branches also bear curved spines up to 2 cm with conspicuous dark scales. The leaves are compound, usually 3-5 pairs of shiny leaflets plus a terminal leaflet, margins entire or crenulate. The flowers are yellow green, sweet scented in racemes or little branched panicles to 10 cm, usually borne below the leaves at the base of the new branchlets. The fruit is pink, obliquely ellipsoid, about 5-8 mm long, splitting to allow the shiny black seeds to partly protrude.

Traditional medicinal use

Zanthoxylum chalybeum is widely used in traditional medicine. It is commonly referred as *Mjafari* by the inhabitants of Msambweni district. Among the Giriama, Duruma and the Digo of South Coast, the root is used to treat malaria. In a general study of East African medicinal plants, Kokwaroreported multiple uses for this plant as follows; Stem bark decoctions or root bark decoctions are widely taken to treat malaria, given to goats suffering from diarrhea., leaves used against snake bite, boiled leaf decoction drunk for the treatment of oedema in kwashiorkor, fruits used for chest pain, fever and sore throat. Similar observations were earlier recorded by Timberlake (1987) among the Pokot of northern Kenya. According to, the Luo of Siaya extensively used *Z. chalybeum* roots and seeds for the treatment of chest pains and stomach pains.

Plectranthus barbatus Andr. (Lamiaceae)

Plectranthus barbatus is a perennial branched, aromatic herb belonging to the botanical family of Lamiaceae (Labiatae). It is one of the 10 species of the genus Plectranthus having greatest number of synonyms and most

number of uses. It is a herbaceous plant with a thick and perennial rootstalk. The stems grow up to 1-2 feet and become decumbent, when grown larger. The inflorescence and flowers are typical of the family Labiatae. The roots are fasciculate, thick, succulent, and contain the unique chemical forskolin.

Figure 2: *Plectranthus barbatus* herb

Traditional medicinal use and chemical constituents

Plectranthus barbatus is locally known as *Mraga dare* by the people of Msambweni, where the root bark has been used in traditional ethnomedicine against malaria. In Kenya, the plant is used in the treatment of wounds and ringworms. Other benefits include help in losing weight by improving the breakdown of fats, improving digestion and nutrient absorption, lowering cholesterol, and immune system support. It is also used in the treatment of stomach ache and as a purgative, for nausea. In India the roots are used in the treatment of pickles.

In Brazil, it is used in the treatment of gastritis and intestinal spasms. In Kenya and the Democratic Republic of Congo, the plant is used in the treatment of wounds and ringworms. *P. barbatus* contains many chemical compounds that are diterpenes in nature. The roots contain an essential oil with an attractive and spicy note. It can find application in the food industry as a flavourant. The active phytochemical in *P.barbatus* is forskolin, has a vast array of effects on the body, working primarily on the enzymatic level, raising the level of cyclic AMP (adenosine 3, 5- monophosphate) a substance that activates all sorts of other cellular enzymes.

Conclusion

Scientific studies on the medical use of the three plants with traditional data on antimalarial efficacy have yielded fruitful results. Pharmacological studies show that they have antimalarial activity and have no serious toxicological effects. In addition, the results of this study identified two of the investigated plants as promising candidates for further research as potential sources of a new class of herbal antimalarials. The current study reports to the best of its knowledge for the first time on the in vivo antimalarial activity of P. barbatus.

References

1. Ngurea PK, Kimutaib A, Zipporah W, Rukungad G, Tonui WK. A review of Leishmaniasis in Eastern Africa. J Nanjing Med U. 2009; 23:79–86.

2. Shahinas D, Folefoc A, Pillai DR. Targeting *Plasmodium falciparum* Hsp90: towards reversing antimalarial resistance. Pathogens. 2013; 2: 33–54.

3. Pradeep D, Steven S, Philippe D, Atul M, Roshan T, Niyamat AS, Dipika S, Arvind P, Rhonda S. Annual incidence of visceral leishmaniasis in an endemic area of Bihar, India. Trop Med Int Health. 2010; 10:1365.

4. Nahrevanian H, Milan BS, Kazemi M, Hajhosseini R, Mashhadi SS, Nahrevanian S. Antimalarial Effects of Iranian Flora *Artemisia sieberi* on *Plasmodium berghei* In vivo in mice and phytochemistry analysis of its herbal extracts. Malar Res Treat. 2012. doi:10.1155/2012/727032.

5. Uzun S, Uslular C, Yucel A, Acar MA, Ozpoyraz M, Memisoglu HR. Cutaneous leishmaniasis evaluation of 3074 cases in Cukurova region of Turkey. Br J Dermatol. 1999; 140: 347–50.

6. Alavi-Naini R, Fazaeli A, Dempsey OT. Topical treatment modalities for old world cutaneous leishmaniasis: a review. Prague Med Rep. 2012; 113:105–18.

7. Zand M, Narasu ML. Vaccination against leishmaniasis. Ann Biol Res. 2013;4:170–4.

8. Croft SL, Coombs GH. Leishmaniasis-current chemotherapy and recent advances in the search for novel drugs. Trends Parasitol. 2003;19:502–8.

9. Hardman JG, Limbird LE. Drugs used in the chemotherapy of malaria in The Goodman and Gilman's Pharmacologicalbases of Therapeutics. 10th ed. New York: McGraw-Hill; 2001.

10. Leslie T, Mikhail A, Mayan I, Cundill B, Anwar M, Bakhtash SH, Mohammed N, Rahman H, Zekria R, Christopher JMW. Mark Rowland Rapid diagnostic tests to improve treatment of malaria and other febrile illnesses: patient randomised effectiveness trial in primary care clinics in Afghanistan. Br Med J. 2014;348:1–13.