Medicinal Plants and Sickle Cell Anemia: The experience of Congo, DR

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ABSTRACT:
The search and development of antisickling herbal drugs constitute a priority agenda in Democratic Republic of the Congo (DRC), where Sickle cell anemia (SCA), one of the major public health problems affecting Africa, is endemic. The aims of our research program were (1) to identify plants traditionally used in folk medicine for managing SCA in DRC, (2) to identify other/new sources of antisickling bioactive secondary metabolites mainly from great apes pharmacopeia, (3) to validate their bioactivity, (4) to identify and elucidate the structures of the bioactive compounds/secondary metabolites and (5) to formulate a polyherbal medicine for managing SCA.

Keyword: antisickling herbal drugs, Sickle cell anemia, polyherbal medicine,

Methodology: The plant extracts were screened for antisickling activity using validated bioassays (Emmel test, polymerization of haemoglobin S assay; osmotic fragility assay; anti-hemolytic test; radical scavenging assay and Met-hemoglobin profiling assay). The molecular structures of the active compounds were characterized by combining the chromatographic and spectroscopic methods. The toxicity bioassay of herbal medicine was carried out using the Wistar rats and Guinea pigs as animal models and clinical trial in SCA human patients.

Findings: About 150 plant species from human and great apes pharmacopoeia were biologically screened. Anthocyanins, organic acids (betulinic, maslinic, oleanolic and lunularic acids) and butyl stearate displayed antisickling activity. The resulted herbal medicine Drepanoalpha® is safe (DL50 > 4000 mg/kg, Wistar rat or 16000 mg/kg, Guinea pig). Drepanoalpha® boosts hemoglobin rate in the treated animals and sicklers. Non-recourse to blood transfusion is done for a long period after cessation of medication (four months minimum). The herbal drug does not alter liver (transaminases SGOT and SGPT, total direct bilirubin) and kidney (urea and creatinine) functions in both animals and treated patients. The chemical analyses of this medicine revealed the presence of total polyphenols, flavonoids, anthocyanins, tannins, glucids, lipids, proteins and micro-nutrients (Zn, Mn, Fe, Mg, Ca, K, and P) as well as the vitamin C. This phytomedicine displayed antibacterial effects (S. aureus and M. tuberculosis).

Figure 1: Antisickling effects of the herbal drug and derived secondary metabolites

Conclusion & Significance: The herbal drug Drepanoalpha® contains plant secondary metabolites, macronutrients and minerals of pharmaceutical and nutritional relevancies for managing SCA and could improve the life expectancy of SCA patients. The herbal drug displays the in vitro and in vivo antisickling effects by various modes of action and is safe for a use in the large scale.

REFERENCES


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