Natural Product Research and Drug Discovery at Federal University of Technology, Minna, Nigeria: Challenges and Opportunities

Background

- Nigerians, like other Africans, are overburdened by the problems of infectious diseases

- Increasing incidence of non-infectious diseases such as diabetes and cancer is worsening the situation

- Sustainable control programmes are not in place due to a variety of socio-economic factors

- Available drugs in the market have problems of inaccessibility and prohibitive cost, coupled with increasing resistance in many cases, and in some cases unacceptable toxicity

❖Investment by drug manufacturers in rich and developed countries is unattractive because most of the diseases are diseases of the poorest people and therefore there are no financial incentives

❖Consequently most of these diseases suffer serious neglect.

❖Significant portion of the population depend on herbal remedies for treating their illnesses

❖Nigeria and indeed the whole of Africa is richly endowed with vast amounts of yet unexploited flora and fauna

Current Research Efforts

- Medicinal Plants with emphasis on:

  - Antiprotozoal (Plasmodium, African trypanosomes, and Trichomonas) Agents

  - Antibacterial (*S. aureus, Salmonella typhi, E.coli, P. aeruginosa, B. subtilis, Mycobacterium bovis*) Agents

  - Antifungal (*C. albicans* and mycotoxin producing fungi)

  - Antihelminthes

  - Antidiabetics

Current Research Efforts Continued

- Insecticides/Repellants (mosquitoes)
- Anticonvulsants

- Exploration of insects/ants for medically important constituents just started

Goals

❖Obtain extracts with significant efficacy and safety margin for standardization and use as herbal remedies in therapeutic control of diseases as appropriate

❖Isolate bioactive phytoconstituents for both the development of Phytopharmaceuticals and/or as templates for synthetic modification in the manufacture of synthetic drugs

Experimental Approaches

- Air dried and powdered or ground plant samples are sequentially extracted in nonpolar to polar solvents

- Bioactivity tested in *in vitro* and *in vivo* systems

- Fractionation is bioactvivity-guided

- Dried extracts obtained using rotary evaporator (for organic solvents) or freeze drier (for aqueous extracts)

Modest Achievements

- Extracts that cure *T. brucei* infection in mice
- Extracts with antidiabetic activity comparable to that of standard drugs
- Extract with activity against *Plasmodium berghei* comparable to chloroquine and with good analgesic activity
- Extracts with significant anticonvulsant activity (providing up to 83.3% protection against maximal electroshock)

Achievements continued

- Extracts with antibacterial (*Salmonella typhi, E. coli, Staphylococcus aureus, mycobacterium bovis*) activity better than most of the standard drugs (chloramphenicol, ampiclox, gentamycin, ciprofloxacin, ampicilin)

- Extract of comparable activity with terbinafine against *Candida albicans*

- Publications in journals

CHALLENGES

- Absence of Schools of Pharmaceutical Sciences and Medicine
- Difficulty in using in vitro screening systems because of extreme instability of power supply
- Inaccessibility to research grants of reasonable amounts
- Reluctance of industries and companies to partner with the academia
- Moving from discovery of bioactive extracts to drug production

Opportunities

- GIBEX Network
- ANDI Network

Collaborators

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