

TRADITIONAL MEDICINE IN THE MANAGEMENT OF AIDS

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ABSTRACT: *Some secondary metabolites of herbs and certain products of traditional systems of medicine as possible sources of anti-AIDS drug potentials are presented and discussed.*

INTRODUCTION

WHO, the apex body of the health care of the population has recently recognized that, traditional system of medicine can contribute significantly to certain conditions for which no definite solutions are available in the allopathic system. AIDS is one such immunosuppressive dreadful disease. Several compounds with different chemical structures have been reported as having significant inhibitory effect against HIV in *vitro*. Series of 2', 3' – dideoxy nucleoside compounds have also been synthesized and evaluated for such activity¹. In the present paper, in order to develop natural products as chemotherapeutic agents, bio-active chemicals, plants and plant products which are reported to have anti-HIV activity or expected to possess such activity are reviewed and discussed.

The essential aspects to remember in the development of plant products in the management of AIDS are

- (i) Selection of proper plants.
- (ii) Selection of proper extraction and isolation procedure,
- (iii) Selection of proper model for testing

(i) Selection of plants

Though the selection of the right species from a vast source for a particular ailment is difficult, one can adopt the following methods.

- a) A systematic examination for the anti-HIV principle can be initiated only, if an adequate background regarding the effectiveness of certain plants is available.
- b) In the event that such a therapeutic agent is available only in small quantities, it is desirable to go in for chemotaxonomically related plants, because most often botanically related plants produce identical or closely related chemicals.
- c) The third method available is random selection i.e either from actual experience or from literature survey, if a particular plant is found to give encouraging results, it is desirable to increase the number of plants hopefully for investigation, by taking more plants belonging to the same general and families.

(ii) Selection for extraction and isolation procedure

Conventional methods are good enough for molecules that are present in larger quantities. Newer methods, developed for the more complex molecules have also to be adopted. In order to double check the efficacy of extraction and isolation, a concurrent biological screening with the extractives is also to be called for. After evaluating the potency of the extracts, the isolation of the active principles should be taken up.

DRUG THERAPY

There are two aspects in tackling the disease (a) the curative aspect (b) the preventive aspect. The traditional system of medicine lays great stress on developing immunity or resistance of the body through food, diet and drugs. For the curative aspect, from rain water to seaweed, the medicinal qualities that nature has are amazing. According to one account more than 3000 species of plants find extensive use in day-to-day practice². The bio-active chemicals that are found in the plants in general are the secondary metabolites which make them important as potent drugs. Alkaloids, steroids, triterpenoids, flavonoids, phenols, tannins, saponins are some of the secondary metabolites.

With this background, let us now take stock of the bio-active secondary metabolites which are at present reported to possess anti-HIV activity and the plants/plant products or related family which can generate similar chemotype principles for development of newer anti-HIV drugs.

Echinacea species (Compositae) have been used for many diseases and conditions as antiviral, antibiotic, antibacterial, anti-inflammatory, immunostimulant and vulnerary. Its immunostimulant property

could make it potentially useful in conditions such as allergies, cancers, chronic infections and AIDS³.

New plant tannins were evaluated as potential inhibitors of HIV replication⁴. The tetragalloyl quinic acids, viz. 3, 5-di-O-galloyl-4-O-digalloylquinic acid, 3,4-di-O-galloyl, 5-O-digalloyl quinic acid, 3-O-digalloyl-4, 5-di-O-galloyl quinic acid were found to inhibit Reverse Transcript activity 90,89 and 84% at 100 μ M and 73,70 and 63% at 30 μ M respectively⁵.

Castanospermine obtained from *Castanospermum australe* A. Cunn. (Leguminosae) has been approved by the Food and Drug Administration of USA as an anti-AIDS Drug. It is also present in the genus *Alexa*^{6,7} of the same family.

Calanolides (coumarin derivatives) from *Calophyllum lanigerum* (Guttiferae) are reported to be a new anti-HIV phenotype for drug development⁸. The alkaloids, muchellamin A and B of *Ancistrocladus abbreviatus* (Ancistrocladaceae) inhibited the production of viral-RT in HIV infected CEM-SS cells⁹. Salaspermic acid (tetraterpene) as inhibitor of HIV-RT and HIV-RT and HIV replication in T-lymphocyte cells was reported from the roots of *Tripterygium wilfordii* Hook.f. (Celastraceae¹⁰). Tripterifordin, a new kaurane type diterpene lactone from *T.wilfordii* also showed anti-HIV replication activity with an EC 50 of 1 μ g/ml¹¹.

The three flavonoid alkaloids viz. O-dimethyl buchenavianine N, O-didemethyl tuchenavianine and the buchenavianine from the leaves of *Buchenavia capitata* (Vahl) Eichl (Combretaceae) represent a new chemotype for anti-HIV activity¹². Out of new 100 plant extracts screened for anti-HIV potentiality the extracts of

Nattuvadumai – *Terminalia catappa* L. and *T.alata* (Combretaceae) are found to have 97% and 90% inhibitory activity respectively¹³. *T. alata* root bark was found to contain cleanolic acid, arjunic acid, arjunetin, arjunolic and ellagic acid¹⁴. Marudu – *T.arjuna* W & A resulted in the isolation of gallic acid, ellagic acid, arjunolic acid, arjunglucoside. The different constituents identified in the fruits of tanrikkai/vibhitaki – *T.beleric* Roxb. include β -sitosterol, gallic acid, ellagic acid, ethyl gallate, galloyl glucose, Chebulagic acid and bellericanin^{15,16}. Presence of these polyhydroxy compounds particularly gallic and ellagic acid in *T.arjuna* W.A and *T.belerica* Roxb. Similar to *T.alata* of the same family is definitely suggestive of these two plants possessing anti-HIV potentiality.

Saponin B1 from soyabean *Glycine max* merr (Leguminosae) is reported to have inhibitory activity against HIV infection¹⁷. The drug serankottai / bhallataka – *semecarpus anacadium* Lenn.f.

(Anacardiaceae) is claimed to possess anti-AIDS activity. It contains several biflavonoids which has phenolic hydroxyls¹⁸. Nilavembu / Kirata tikta – *Swertia chirata* Buch. Ham (Gentianaceae) is used as blood purifier, appetizer, and in intermittent fever including malaria. Chemical examination has yielded several xanthaones (poly hydroxyl compounds)¹⁹. The presence of many poly phenolic compounds in larger amounts supports the suggestion to these plants being possible anti-HIV drugs.

Psoralen from Karpokarici / Bakuchi – *Psoralea coryfolia* L. (Leguminosae) was investigated for AIDS therapy²⁰. The seeds of bakuchi contain an essential oil (0.05%), resin (8.6%), bukuchiol, flavones and several coumarin compounds which might possess anti- AIDS property. The following plant²¹ are also suggested for screening based on the close structural relationship of the phytochemicals present in them with the reported anti-AIDS drugs.

Valuluvai (Jyotishmati)	- <i>Celastrus paniculatus</i> Willd (Celastraceae)
Nannari (Sariva)	- <i>Hemidesmis indicus</i> R. Br. (Asclepiadaceae)
Thottalvadi	- <i>Mimosa pudica</i> L. (Leguminosae) (Lajjalu)
Kungiliyam (Salaniryasa)	- <i>Shorea robusta</i> Gaertn (Diperocarpaceae)
Vellarikkai	- <i>Cucumis sativus</i> L. (Cucurbiataceae)
Saraipparuppu (piyalaka)	- <i>Buchnania lansen</i> Speng (Anacardiaceae)
Ma (arma)	- <i>Mangifera indica</i> L. (Anacardiaceae)
Carrot	- <i>Daucus carota</i> (umblliferae)

- Ilanthai (Badari) - *Zizyphus jujube* (Rhamnaceae)
 Vembu (Nimba) - *Azadirachta indica* L. (Meliaceae)

Marine products:

Not only plant products, the bio-active chemicals from marine animals are also reported to possess anti-HIV activity. Sphingosine, sphinganine, their amides with fatty acids of 16 to 26 carbon atoms (ceramides) and closely related compounds are important components in both plant and animal cells. Some of the ceramides are found to be effective against AIDS and HIV related diseases and also for the treatment of multiple sclerosis. A soft coral – *Nephthea* sp. and a seaworm have afforded (+) – erythro – 2 – amino – 4E, 8Z, octadecadiene, 1,3-diol N-palmitate; clams- *Solen bravis* and *Barnea candida* gave 2-amino-4E-octadecaene-1, 3-diol palmitate. Holothuroid – *Thorsonia investigatoris* resulted in the isolation of a pair of ceramide-1-glucoside²². These ceramides expected to have anti-AIDS activity need screening.

Compound formulations

Apparantly these are the plant suggested for further study to develop a new chemotherapeutic agent for AIDS. In traditional medical practice, generally the plants are often used in the compound form to which other herbs, metals, minerals and animal products are added. Thus the following siddha compound formulations herbal and herbomineral which are expected to possess anti-HIV potentials are also suggested as they are described in literature for sexually transmitted diseases²³.

1. Maha vallathi ilekiyam
2. Ven pucani ney

3. Kungiliya parpam
4. Panca thipakkini curanam
5. Venpucani ilekiyam
6. Cenkottai ney

Anti-AIDS potentials from metals and mineral drugs which have not been examined so far, also need screening.

1. Poornachandiroyam
2. Iraca kanthi mezhuku
3. Parangi pattai pathangam
4. Kanthaga iracayanam
5. Iraca centuram
6. Iedivallathi mezhuku
7. Iraca mezhuku
8. Nanthimezhuku

Because of the toxicological findings, medicines of metals and minerals are not being paid much attention to, by the modern medical physician and increasingly so by many a traditional medical practitioners. However, the persisting use of these materials in certain diseases and diseases arising out of the deficiency of some of these elements is note worthy.

Chromium, cobalt, copper, fluorine, iodine, iron, manganese, molybdenum, nickel, selenium, silicon, tin and vanadium are essential trace elements besides the major ones like sodium, potassium, phosphorus etc. The most dreaded ‘mercury’ has apparently not yet been adequately studied for use in AIDS²⁴. It is sure that these

elements in their inorganic or compound forms might also possess anti-AIDS potentials.

Preventive aspect

Prevention of diseases and prevention as well as promotion of positive health are emphasized in traditional medical practices. These measures are called rasayana or rejuvenation of body and mind. The following remedies can be used for promoting the power of body resistance.

Vallari - *Centella asiatica* L.
(Saraswatha) (Urban) (Umbelliferae)

Nellikai - *Embllica officinale*
(Amalaki) Gaertn (Euphorbiaceae)

Amukkara - *Withania somnifera*
Dunal (Solanaceae)

Satavari - *Asparagus racemosus*
Willd (Liliaceae)

Katukkai - *Terminalia chebula*
(Haritaki) (Combretaceae)

The kayakalpa drugs described in Siddha system of medicine and the following

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compound preparation are also administered to promote the power of body resistance and revitalizing the immune^{25,26}.

1. Cyavan prasa
2. Dhatri rasayana
3. Brahmi ghrta
4. Asvagandhadi lehya
5. Satavari paka
6. Agastya rasayana

CONCLUSION

Plants/plant products and compound preparations discussed so far could be taken up for further studies for tackling the AIDS problem.

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