PREVENTION AND TREATMENT OF DENGUE WITH NATURAL DRUGS

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ABSTRACT
Dengue is a prevalent mosquito-borne infection in human beings, which has become major international public health disquiet in recent years. Symptomatically dengue virus infections can present with a spacious range of clinical signs, from a mild feverish illness to a life-threatening shock syndrome. Many herbal/natural drugs have been used as antiviral, larvicidal, mosquitocidal and mosquito repellents against dengue. The objective of this review article is to provide current approaches for the treatment and management/prevention of dengue.

Keywords: Dengue, Antiviral, Larvicidal, Mosquitocidal and Mosquito repellents

INTRODUCTION
Dengue is an acute mosquito-transmitted viral disease (Jose et al., 1998). Now a days dengue is a prevalent mosquito-borne infection in human beings, which has become major public health issue world over. Symptomatically dengue virus infections can present with a wide range of clinical signs, from a mild feverish illness to a life-threatening shock syndrome. Both viral and host factors are thought to contribute to the appearance of disease in infected persons (Jahan, 2011). Dengue viruses occur as four antigenically related but discrete serotypes transmitted to humans by Aedes aegypti mosquitoes (Halstead, 1988). Southeast Asia, western Pacific, and America are the endemic regions where incidence and case fatality is observed for dengue and Dengue Hemorrhagic Fever (DHF). For diagnosis of the disease, different methods for viral isolation and the serological, immune histo-chemical, and molecular methods have been reviewed (Maria, 2002). This severe syndrome recently has also been recognized in children infected with the virus in Puerto Rico that is characterized by increased vascular permeability and abnormal homeostasis. Replication of dengue viruses takes place in cells of mononuclear phagocyte lineage, and enhances dengue virus infection by sub neutralizing the concentrations of dengue antibody. This antibody-dependent enhancement of infection regulates dengue disease in human beings. Disease can also be controlled genetically, possibly by allowing and restricting the growth of virus in monocytes (Halstead, 1988). Efforts to control this disease are dependent on understanding the pathogenicity of dengue viruses and their transmission dynamics. Pathogenicity study is in a weak position by the lack of in-vitro or in-vivo models of austere dengue disease (Rebeca et al., 1997). The status for vaccine development has been described and emphasized that the only alternative available today to control the disease is through the control of its vector Aedes aegypti (Maria, 2002). The following are the plant sources reported to have antivirals, larvicidals, mosquitocidals and mosquito repellents activities.

ANTIVIRALS
Kaempferia parviflora
Local name of the plant Kaempferia parviflora is chandramul. Chemical constituent is borneol. It belongs

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to the Zingiberaceae family. Leaves and stem are used as herbal remedy against virus. Four serotypes for dengue have been recognized i.e. DEN 1, DEN 2, DEN 3, and DEN 4. Recent studies show that DEN 2 particles are directly inactivated by some bioactive compound in *K. parviflora*. The plant extract activity is dose dependent (Hafidh et al., 2009).

**Quercus lusitanica**

Local name of *Quercus lusitanica* is mazu phal. Chemical constituents are the gallic acid and ellagic acid. The whole plant is used as drug. *Quercus lusitanica*, also known as *Quercus infectoria*, is a small tree or a shrub belonging to the Fagaceae (Quercaceae) family. Test was performed on methanol crude and fractionated extracts of *Quercus lusitanica*. The cytotoxicity of these plant extracts was evaluated by determining the maximum non-toxic dose (MNTD) on C6/36 cells. Antiviral activity was estimated by the reduction of the cytopathic effect (CPE) of DENV-2 in C6/36 cells and by the reduction of virus titre. The crude methanol extracts of *Q. lusitanica* at the concentration of 180 μg/ml was found to completely inhibit the dengue virus infection. The extract of the plant inhibits the replication of virus (Noorsaadah et al., 2006).

**LARVICIDALS**

**Piper longum**

Local name of *Piper longum* is pipal, pippli. It belongs to family Piperaceae. Three species i.e. *Piper longum* L., *P. ribesoides* Wall and *P. sarmentosum* Roxb of this family, as ethanolic extract have been used in research. Efficacy of these species is in following order: *P. longum* > *P. sarmentosum* > *P. ribesoides* Wall. This study conclude that Pepper plant possess activity against *Aedes aegypti* (Chaithong et al., 2006).

**Murraya koenigii**

Local name of *Murraya koenigii* is Kari patah or Kariapat. Family is Rutaceae. It is aromatic deciduous shrub of small tree. Whole plant is used as herbal remedy. The hexane, diethyl ether, dichloromethane and ethyl acetate crude extracts of the whole plant was prepared and pupa and adult mosquitoes were allowed to grow over there. During the experiment larvae and adults were fed normally. As a result of the experiment the larval and pupal deformations were observed and there was also inhibition of adult emergence. Hence, it causes abnormalities in adult formation. Therefore, it can be used as larvicidal (Arivoli and Samuel 2011).

**Pimpinella anisum**

Local name of *Pimpinella anisum* is Anisuan. It belongs to the family Apiaceae. Whole plant is used to extract essential oil. The essential oil of this plant is highly toxic to larvae of *Aedes aegypti* (Veena et al., 2005).

**MOSQUITOCIDALS**

**Curcuma longa**

*Curcuma longa* is rhizomatous, herbaceous perennial plant of ginger family, Zingiberaceae. Its rhizome is used as herbal remedy. It is also used in foods and in cosmetics. Ethyl acetate extract of *Curcuma longa* rhizomes gives three curcuminoids which show activity in inhibiting topoisomerase I and topoisomerase II, which play important role in DNA replication. Out of these three curcuminoids, curcumin III is the most effective. Turmerone obtained from volatile oil of *Curcuma longa* give 100% mosquitocidal activity against *Aedes aegypti* (Roth et al., 1998).

**Murraya koenigii**

The hexane, diethyl ether, dichloromethane and ethyl acetate crude extracts of the whole plant was prepared and adult mosquitoes were allowed to grow over there. During the experiment adults were fed normally. As a result of the experiment there was the inhibition of adult emergence by losing their consciousness. Hence, adults cannot bite and don’t show any activity because of the knock-down ability of this plant. Thus, it can be used as Mosquitocidal (Arivoli and Samuel, 2011).

**MOSQUITO REPELLENTS**

**Eravatamia coronaria**

*Eravatamia coronaria* belongs to the family Apocynaceae. Its leaves are used as herbal remedy. Crude benzene and ethyl acetate extracts of the leaves of *Eravatamia coronaria* are used as repellent for *Aedes aegypti*. The results are collected by studying the repellent activity at three different concentrations 1.0, 2.5, and 5.0 mg/cm. These concentrations were applied on the skin of forearm of a man and exposed against female *Aedes aegypti*. This plant gives protection against this mosquito without any allergic effect. The mosquito repellent activity is dose/concentration dependent (Govindarajan et al., 2009).

**Caesalpinia pulcherrima**

*Caesalpinia pulcherrima* belongs to the family Fabaceae. Part used is leaf. Crude benzene and ethyl acetate extracts of the leaves of *Caesalpinia pulcherrima* are used as repellent for *Aedes aegypti*. The results are collected by studying the repellent activity at three different concentrations 1.0, 2.5, and 5.0 mg/cm. These concentrations were applied on the skin of forearm of a man and exposed against female *Aedes aegypti*. This plant gives protection against this mosquito without any allergic effect (Govindarajan et al., 2009).
Andropogon citratum

Andropogon citratum belongs to the family Poaceae. Its common name is citronella grass. Active constituents of this plant are essential oil and citronella oil. This oil is put in candles and lanterns that can be burned to repel mosquitoes. Its mosquito repellent qualities have been verified by research, including effectiveness in repelling Aedes aegypti (Onanong et al., 2009).

The nanoemulsions of this plant oil were made and was investigated both in-vivo and in-vitro. High pressure homogenization to convert larger emulsion droplets (195-220 nm) to smaller size droplets (150-160 nm) results in higher release rate. Thin films are obtained from nanoemulsions which have droplets of small size. Such films have more integrity, hence, they increase the vaporization of essential oils subsequently prolonging the activity of mosquito repellent (Ibrahim et al., 1998).

Syzygium aromaticum

The family of Syzygium aromaticum is Myrtaceae. Its Urdu name is Laung. Essential oil of this plant is used as insect repellents. Experiments show that undiluted clove oil can repel many species of mosquitoes for up to two hours. However, this concentrated clove oil may cause skin rash in sensitive people. Recommended dilution is less than 24% (Dan et al., 2004).

CONCLUSION

Natural drugs possess activity against Aedes aegypti by their antiviral mechanism, larvicidal and mosquitoicidal action and mosquito repellents property. Work on structural activity relationship of active compounds found in the reported plants may help to develop new medicines for the prevention and treatment of dengue.

REFERENCES


