

The bioactivity of Neem (*Azadirachta indica* A. Juss.) based products against various animal systems

Mahira Parveen

Department of Zoology, Government P.G. College, Bina-470 113 (India)

ABSTRACT

The neem tree *Azadirachta indica* A. Juss. (Meliaceae) is native to Southeast Asia and grows in many countries throughout the world. It contains several biologically active organic and inorganic compounds. It has received world wide attention in recent years as the activity of various parts of neem for killing pests has been found of great importance.

Key words : Nimbidin, Antifertility, Antimicrobial Spermicidal.

Use of neem to ward off damage by pests is well known to Indian masses. Ancient Indian folk mixed dried neem leaves with storage grains and wrapped in woolen clothe to protect them from ravage of insects. These significant medicines as well as biocidal properties of neem have been reconfirmed by modern science. The tree has also immense potential to protect environment trough rehabilitation of degraded ecosystems and wastelands. The adaptability of neem based pesticides to a wide range of soil and climate as well as capability to perform better than many synthesized pesticides in arid and semi arid regions establish it as the most preferred pesticide. Besides pesticidal activity the neem has shown a great medicinal behaviour also. Various functions of neem based components are observed beneficial in physiological and biochemical functions of mammals.

Dermatological effects :

The products of neem have caused curative effect for skin diseases such as ringworm and scabies. Administration of neem extract to patients with ringworm disease treated the disease effectively.

Antipyretic effects :

Neem leaves extracted in methanol when administered orally to rabbits and rats it shown antipyretic effect. This antipyretic action may be due to the inhibition of prostaglandin synthetase.

Anti inflammatory effects :

Neem leaves and bark extract prepared in 75% methanol when administered in doses of 400 to 800 mg/kg showed antiinflammatory effect in rats. In various experiments on rats

carrageenin induced oedema has been inhibited by oral administration of 20-40 mg/kg nimbin dose, polysaccharides isolated from barks.

Antifertility effects :

The neem products caused antifertility response in rats and humans *in vivo* and *in vitro*⁹. The neem oil has a spermicidal effect against human and rhesus monkey spermatozoa¹⁰. Besides this the azadirachtin affect vitellogenesis. The treatment of azadirachtin also caused the decrease in size and weight of ovary that was almost half of the control. The mature oocytes developed are also found less in number³. The azadirachtin also caused the pregnancy failure in rats, rhesus monkey and human. In rats the oral administration of neem oil (25ml) caused an anti implantation effect in rats². The neem extract (Nim 76) when applied externally at genital organs prevented pregnancy in rats, rabbits, rhesus monkey and human.

The fecundity rate is also reduced by the azadirachtin application in moths. The egg production was reduced by almost 90% in the azadirachtin treated rats as compared to that of control. The duration of egg laying was also decreased to 2 days while in untreated moths it is 7 days. The rate of hatchability of eggs in moth is also reduced by approximately 65% after azadirachtin treatment as compared to control.

Effect on Cardiovascular system :

The neem leaf extract in aqueous solution caused an initial rise in blood pressure in dogs. The dose was injected as 3g of extract of leaves. A dose of 40mg/kg of the extract

showed anti arrhythmic activity against ouabain induced disarrhythmia in rabbits¹¹. Dose of sodium nimbidinate as 10mg/kg when injected intravenously to rats caused a perceptible fall in blood pressure within 10 seconds. The hypotensive activity caused by alcoholic extract of neem leaves due to the nimbolide and 3-deacetylsalannin, tetranotriterpenoids isolated from the chloroform soluble portion of an alcoholic extract of neem leaves has been observed⁴. This hypotensive activity is probably due to the its effect on vascular smooth muscles resulting into vasodilation and hypotension.

Anti ulcer effect :

The oral doses of nimbidin 20, 40, 80 mg/kg protected rats from acetylsalicylic acid stress, serotonin or indomethacin induced gastric lesions in rats. The similar preventive effect has also been observed against histamine or cysteamine-induced duodenal lesions in guinea pigs and rats also⁵. This mechanism is due to the function of nimbidin as an antihistamine blocker specifically H₂ receptors, thereby helping as an anti ulcer agent.

Antimicrobial activity :

The neem based products obtained from leaf extract have been reported to show antifungal and antiviral effects⁷. The aqueous extract of neem has no direct viricidal action but they inhibit the multiplication of vaccine and fowl- pox viruses⁷.

The recent studies on the toxic and medicinal effects of neem based products show the intense reaction in mammalian body. However, the widespread use of neem leaves,

bark and seeds for medicinal purpose has not been in practice yet. Various effects like spermicidal and use as contraceptives, anti-inflammatory agent, anti ulcer agent etc have been found very significant in case of mammals as well as human.

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