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PHARMACOLOGICAL EFFECTS OF *ANNONA SQUAMOSA*

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ABSTRACT

In this review, we are discussing about the traditional and pharmacological studies done on the well known medicinal plant *Annona squamosa.* This plant has been used since the ancient time, due to its medicinal properties. The different parts of the plant is used to treat many harmful disease. Natural product are considered as the best product due to no or less side effects. Pharmacological studies of *Annona squamosa* made a fruitful attempt to make alternate medicine with no or less side effects, they are also used in the development of potential drugs. Their remarkable properties like Anti-tumor and other pesticidal activities has grown the greatest interest around the globe. The plant posses some pharmacological studies like Anti-microbial activity, Anti-oxidant activity, Anti-inflammatory activity, Genotoxic activity, Anti-ulcer activity and much more. In this review a small attempt is made to provide the knowledge of pharmacological activities of *Annona squamosa*. The information listed in this review could be used to develop new pharmacological agents from the well known plant *Annona squamosa.*

KEYWORDS: *Annona squamosal*, Genotoxic activity.

INTRODUCTION

Annona squamosa (Annonaceae) generally known as custard apple tree, which belong to family Annonaceae. It is a medium sized tree, found mainly in Asia, Africa, Australia and America. Where as the cultivation is also present throughout India because it is edible in nature.

It is also known by some of the local names such as sugar apple, custard apple. The pulp of the fruit taste really sweets because it contains sugar content (which is about 58% of the dry

mass) thus the calorific value of fruit pulp is very high. plant contains, many medicinal properties such as insecticidal, Anti-tumor agent, Anti-diabetic, Anti-oxidant, Anti-lipidemic and Anti-inflammatory agent. The leaf extract of *Annona squamosa* was also reported to treat hyperthyroidism. Leaves were also used in insecticidal and Anti-spasmodic agents (which were use in the treatment of Rheumatism and painful spleen). This plant is also beneficial who are suffering from fertility problems. This plants contains some antifertility properties which were tested in mice and rats.

Various phytochemical investigation made on this plant, which reported that a wide varieties of compounds like acetogenins were present which is responsible for anti-feedent Anti-malarial, cytotoxic and the immunosuppressive activities.

Annona squamosa shell was astringent and was found to be useful for the treatment of chronic diarrhea.

This review covers the pharmacological properties different parts(leaves, seeds etc.) of *Annona squamosa* and biological active constituents which are responsible for different therapeutic activities and treatment potentials. This considerable attention towards the benefits of biologically active chemicals, which contribute to the further development of potent drugs to certain pathologies.

History

It is believed that Sitaphal is originated in WEAST INDIES but originally it is brought from central America to Mexico. Later it has been cultivated Peru and Brazil but commonly grown in Bahamas and occasionally in Bermuda and Florida. It was introduced into tropical Africa by Portuguese Traders Beside this its arrival in India is much debated. When the Portuguese came to India they brought this fruits with them, but Sitaphal was already cultivated in India according to Ain-e-akbari, the 16^{th} century documentation of Mughal emperor Akbar's kingdom. It is also found in the paintings of Ajanta and sculptures of Mathura.

Mythologically it is said that, wife of lord Rama, Sita during her vanavas used to eat five fruits Sitaphal, Ramaphl, sour soup, Hnuman phal, Ilama. It is said that during abduction period of Sita by Ravana, her tear drop gave birth of 'Sitaphal' tree in wilderness.

The pulp tastes sweet and resembles like 'Custard' so that it is call 'CUSTERD APPLE'. The Bengali name 'ATA' and Nepali name 'ATI' are come from its old Mexican name 'ATE'.

The Hindi name 'SITAPHAL' is came from the name of wife of lord Rama, SITA. Another thought is that it is originate from Sanskrit word, 'Sita' means 'Cold' and 'Phal' means 'Fruit'; the fruit which keeps the body cooler as the meditational value of Sita phal was known in ancient India.

According to controversy when the traders brought 'Custard apple' in India they named this fruit after mythological character 'Sita' to sell this fruit.

Today custard apple is popular in Bengal as well as India and is cultivated in topical region all over the world.

Traditional use of *Annona squamosa*

*Annona squamosa*_(sitaphal) is used traditionally in the various properties like anti-inflammatory agent, anti-diabetic, anti-epidemic, anti-tumor agent and as an insecticidal which may be described due to the presence of cyclic peptides. An infusion of two handful of fresh leaves in 1 liter of water is prepare to confront the palpitation and the heart failure. This infusion has anti-pasmodic activity and this infusion is too effective for the proper digestion. Sitaphal seeds have an anti-parasitic activities (against lice). *Annona squamosal* seeds are constructed and heated over a water bath for 3 hours before using for the hairs.

In India on ulcers and wounds people apply the crushed leaves and the decoction (method of extraction in which substances boiled specially in medicinal formation made from a plant) of leaf is taken in the disentary diease. The bark decoction is given in the form of toxic and to arrest the diarrhoea. In the area of the tropical America, leaves decoction is consumed in the form of cold remedy, digestive, emmenagogue, febrifuge, toxic or to elucidate/refine the urine. The leaf decoction of *Annona squamosa*_is also utilized in baths to reduce the rheumatic pain. The operation of aqueous extract of the leaf also ameliorate the activities of plasma insulin and reduced the levels of blood glucose and lipid peroxidation.

Traditional uses of plant parts

Leaves

When contused are applied for extraction of guinea worm and wen reduced to powder are used to kill lice cattle. It has limited use in perfumery. Sitaphal leaves are used in treatment of hysteria, anal prolapse, fainting spells (sudden and temporary lose of consiouness).

Fruit

Annona squamosa fruits are beneficial in huge amount, crushed ripe fruit is mixed with salt is applied on tumor. Formulations shows action as astringent, expectorant, cooling and in curing annaemia and burning sensation. According to Ayurveda fruit is considered as a good toxic and is helpful in increasing muscle, strength and improve the blood.

Bark

Bark is strong astringent and toxic. Fiber extracted from bark has been utilized for garbage to prevent the diarrhea, anti-cancer a toxic is given by the bark decoction.

Seed

Annona squamosa seeds has a property of hypotensive, anti-inflammatory and the seeds are used as fish poison. And te extract seeds shows the anti-tumor analgesic activity and haemolysis od RBCs. Seeds are used in removing the lice present in hairs if seeds are mixed with gram flours and seeds has a very outstanding hair wash treatment.

Root

Annona squamosa roots are applied as purgative in cure of dysentery, diabetes, spinal marrow disease.

Tree

Tree of *Annona squamosa* is a good and vital source of fire wood. Tree serve as host for lac excreting insects. Trees grow in gardens as decorative tree.

Pharmacological activity of *Annona squamosa*

Vasorelaxant activity

Cyclosquamosin B, cyclic octa pepetide isolated from seeds of *Annona squamosa* contains vasorelaxant property. The property significantly attributes to the inhibition of calcium influx.

Hepatoprotective activity

The hydroalcoholic seed extract of *Annona squamosa* is demonstrated to be hepatoprotective. The seed extract is able to limit hepatic injury which was induced by isoniazide and rifampicin in the liver. The protective role is might caused due to Anti-oxidative effect of the flavonoids present in it.

Anti-ulcer activity

Annona squamosa twigs contains active constituents that protect peptic ulcer. (+)-O-methylarmepavine, N-methylcorydaldine and isocorydine have anti secretory properties. They reduces gastric acidity, pepsin and gastrin level and inhibits H^+-K^+ ATPase pump. *Annona squamosa* leaves are protective against aspirin (ASP) and pyloric ligation (PL).

Anti-helminthic activity

*Annona squamosa*_seed powder are provided with parasiticidal effects. The anti-helminthic activity were evaluated on egg hatching of H. contortus. The seed extracts investigated against earthworm and was found that methanolic extract showed effective activity causing death of earthworm, *Pheretima posthuma.*

Genotoxic activity

The seed extracts of *Annona squamosa* produces a compound isosquamocin which could be used as a promising pesticide for the protection of the plant. The genotoxicity was evaluated by comet assay and other studies and which revealed that genotoxicity causes no risk to humans.

Antherogenic activity

Annona squamosa provides a potential use for antherosclerosis. The background findings include Ent-Kaur-16-en-19-oic acid and 16alpha-hydro-19-al-ent-Kauran-17-oic acid present in the stem have anti platelet property via inhibiting platelet aggregation. The fruity pulp of squamosa modifies plasma lipid which proved beneficial for cardiovascual risk. Oral administration of 5g/kg body weight reduces total cholesterol by 45-46% in healthy animal model.

Renoprotective activity

*Annona squamosa*_leaves aqueous extract is proved to be renoprotective. 300mg/kg, oral intake of extract for 1 month, restores previously raised urea, creatinine and uric acuid levels in streptozotocin. The *Annona squamosa* shows effective_renoprotective effect against renal failre.

Immunodulatory activity

The bark of *Annona squamosa*__containas linuginosine (+)-o-methyl armepavine, lanuginosine(+)-anomuricinum, isocorydine and N-methyl-6,7, dimethoxyisoquinolone can

modulate immune response. The mechanism involves induction of T and B cells to proliferate, stimulation of macrophages, upregulation of CD4+, CD+, and CD19+ cell population and stimulation of IL-2 and INF-gamma production.

Anti-fertility activity

The extract which is obtained from the *Annona squamosa* seed produced has shown anti-ovulatory activity in rabbits but bthe effect is not sufficient due to its less therapeutic effect. Contraceptive action is initiated in male rats with the help of methanol extract which is extracted from the bark and is taken orally.

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