

REVIEW ON CUSTARD APPLE LEAVES

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ABSTRACT

Custard apple leaves have potential antidiabetic and antimicrobial properties and are known to enhance brain activity, heart health, and eye function. This study focuses on analyzing the anti-diabetic effects of *Annona squamosa* leaves from the Annonaceae family. The leaves were dried and powdered to create tablets, which were assessed for hardness, thickness, and weight variation. Antimicrobial tests were conducted against *Staphylococcus aureus* and *Bacillus subtilis* but showed no activity.

Key Words: Custard apple, *Annona squamosa*, Quercetin, Antidiabetic, Anticancer

1. INTRODUCTION:

Custard apple is cultivated in several of Aligarh district in the state of Uttar Pradesh, India and Chota Nagpur district in the state of Bihar, India consume the young leaves of *Annona squamosa* extensively for its anti-diabetic effect. Several studies have been conducted to investigate the anti-diabetic potential of ethanolic and aqueous extracts of *Annona squamosa* leaf against various type 1 and type 2 diabetic models.

Custard apple is cultivated in several regions across India, covering approximately 55,000 hectares. The leaves contribute to sugar regulation in the body due to their fiber antioxidant content.

Additionally, they contain various bioactive compounds, including flavonoids, glycosides, tannins, and phenolic compounds, which demonstrate antioxidative and hypoglycemic properties.

❖ Biological Sources

- 1) Botanical Name: *Annona squamosa*
- 2) Family Name: Annonaceae
- 3) Common Name: custard apple leaves
- 4) Part Used: Leaf

Common name

English : Custard apple, Sugar apple, Sweet sop

Sanskriti : Seetaphalam, Sudha, Subha

Hindi : Seetaphal, Sharifa, Ata

Malayalam: Athachakka, Atha, Seetapazham

Kanda : Sitaphal

Telgu : Sitaapandu

Tamil : Sitapplam

Bengali : Ata

Arabic : Ghista

Italian : Pomo canella

French : Corossolier, Cachiman canelle, Pomme de

Cannelle, Attier

Portuguese: Atta, Fructa do conde

Malay : Nona sri kaya, Sri kaya, Buah nona

Classification:

Kingdom: Planta

Order : Magoliales

Family : Annonaceae

Genus : *Annona*

Species : *Annona squamosa*



❖ **Chemical Factor**

- Phenolics
- annonaceous
- spooning
- flavonols
- alkaloids
- Glucoside

❖ **CHEMICAL CONSTITUENT :-**

Quercetin (0.19–1.60 µg/g)

Gallic acid (0.45–0.89 µg/g)

Coffee acid (0.07–2.57 µg/g)

Ferullic acid (0.72–2.82 µg/g)

Cinnamic acid (0.02–0.05 µg/g)

2. MATERIALS AND METHODS

Plant Material Collection and Preparations

Custard apple leaves are collected from the rural area these Plants are mainly found in the farms, leaves of custard apple are collected in winter season For the presentation of antidiabetic custard apple leaves tablets.

After properly collection of The leaves wash the leaves properly with clean water then dry under morning sunlight, then Crush the leaves and prepare powder.

Method

PREFORMULATION STUDY

A) General Appearance Physical examination like Colour, Odor, Taste is done by Organoleptic inspection.

B) Bulk Density: It refer to packing of particles in powder sample. Bulk density is used to Determine the amount of powder sample that occupies the volume in g/ml. Weighed quantity Of powder sample was transferred into 100ml measuring cylinder.

The volume occupied by Powder material was measured. Bulk density was calculated by using the formula;

$$\text{Bulk density} = \frac{\text{mass of powder}}{\text{bulk volume of powder}}$$

C) Tapped density: Weighed accurate quantity of powder sample was transfer into a Graduated measuring cylinder. Volume occupied by the powder was noted down.

Then Cylinder was subjected to 100-300 taps in tap density apparatus

$$\text{Tapped Density} = \frac{\text{mass of powder}}{\text{Tapped volume}}$$

3. PHARMACOLOGICAL ACTIVITY

Antidiabetic activity of custard apple leaves

Diabetes is an endocrine and metabolic disorder that is primarily characterised by insulin deficiency, insulin resistance, and elevated levels of sugar in the blood. According to the International Diabetes Federation (IDF), the prevalence of diabetes mellitus (DM) is escalating across the globe. In 2016, 415 million people had diabetes, and by 2040, 642 million people are anticipated to suffer from DM. The treatment of DM, numerous oral hypoglycaemic medicinal compounds, such as sulfonylurea (glimepiride), thiazolidinedione (rosiglitazone), and biguanides, are available in addition. The antidiabetic and antioxidant properties of *A. squamosa* leaf extract may be due to the presence of these phytochemicals. The induction of streptozotocin causes specific damage to islet cells and thereby increases blood glucose concentrations. It is well known that gliclazide produces hypoglycemia and is often used as the standard drug in STZ-induced models of moderate diabetes to compare the antidiabetic properties of various compounds. Administration of *A. squamosa* leaf extract in STZ-induced diabetic rats resulted in a significant decrease in blood glucose levels. Quercetin may also induce insulin secretion by activation of L-type calcium channels in the pancreatic cells (Bardy et al., 2013). Quercetin is shown effective against numerous conditions. According to the University of Michigan Health System, studies prove Quercetin's ability to fight and help treat prostatitis, allergies and type 1 and type 2 diabetes.

Antimicrobial activity

Based on studies on the antimicrobial properties of DMSO and the ethanol extract of *A. squamosa* leaves that were evaluated in vitro with the using the agar plate method to combat clinical isolates of *E. Coli* and *P. aeruginosa* Neethu et al. (2016) demonstrated that a mechanism of reduction of these two microorganisms' development as a result of the administration of ethanol extract from *A. squamosa* leaves.

Anticancer Activity

The ability to evade apoptosis is a unique property of human cancers that can result in effective cancer progression and tumour formation. The high resistance of cancer cells to apoptosis against a pertinent stimulus is a critical rationale underlying therapy failure. Hence, a number of cancer treatment strategies, including radiation therapy and chemotherapy, are primarily based on cancer cell apoptosis.

Leaves of custard apple have a number of chemical compounds belonging to diverse groups, including phenolics, annonaceous acetogenins, saponins, flavonoids, alkaloids, glycosides, alkaloids, steroids, and terpenoids. A study was conducted to investigate the in vivo and in vitro anti-breast cancer activity of ASL extracts Anticancer activity.

Ethnic communities use all parts of *A. squamosa* traditionally for treatment of various diseases, such as cancer tumors, skin problems, insect bites, and any others. But there is a part of this plant that is poisonous located in the seeds which can be used to kill lice and head lice, while the leaves of *A. squamosa* can be used as hepatoprotective and immunomodulatory. previous studies, a research has been carried out on *A. squamosa* against anti-cancer related non-alkaloidal moieties particularly the acetogenin. A research on the alkaloids section of *A. squamosa* yielded two benzylisoquinoline alkaloids. Isolated Alkaloids I provide excellent activity for colon cancer cells (HTC116) and also for Human Breast cancer cells (-7) which is related to the activity of benzyl iso-quinoline alkaloids in cancer cells.

Anti-HIV Properties.

Among the 14 isolated compounds studied, 16,17-dihydroxy-entkauran-19-oic acid demonstrated significant activity against HIV replication (Wu et al., 1996) in H9 lymphocyte cells with an EC50 value of 0.8 g/ml.

Antidiabetic Properties

In rabbit studies, 5 g of semi-dried pulp of sugar apple per kg of body weight was found to be effective as an anti-diabetic supplement. In humans, this equates to eating one-eighth of a normal custard apple. The most likely mechanism could be due to increased Insulin sensitivity. Custard apple appears to mimic anti-diabetic effects in animal studies. Insulin stimulates its production and increases the uptake of glucose by muscles, resulting in Blood sugar concentrations are stabilized. In fact, leaf extracts are also useful in Lowering blood glucose levels, and several studies show that *Annona squamosa* leaf Extract can effectively replace lower doses of externally administered insulin.

Anti-infective

The fruit of *Annona* spp. Has been shown to have anti-microbial properties due to a variety of compounds including Ent-kauranes, Acetogenins, essential oils, and Benzylisoquinolines alkaloids. The crude methanol extract of sugar apple and an isolated deterrent are being tested for anti-bacterial activity against *Staphylococcus aureus* and *Streptococcus pneumoniae*. There have also been Reports of chemicals that are active against *Candida albicans*, proteus, and other pathogens.

Uses:

Better insulin Sensitivity

Blood Pressure Control

Rich in Fibre

Antioxidant Power

Low Glycemic Index

Interaction with glibenclamide (anti-diabetic drug): The co-administration of capsules Prepared from leaf extract of custard Apple with glibenclamide improves glucose control In diabetic Patients.

Interaction with glipizide (anti-diabetic drug): The combination of Leaf extract of custard Apple and glipizide decreases the dosage and Requirements of therapy.

4. CONCLUSION

Annona squamosa which is commonly known as Custard apple in English and sitafal in Hindi having Various pharmacological activity such as antidiabetic, Analgesic, anti-inflammatory, wound healing, Antimalarial, cytotoxic, anti-oxidant, anti-microbial and Few more. As we know that, custard apple leaves have good antidiabetic activity. *Squamosa* leaves have Many benefits, especially in the prevention and treatment of disease.

5. REFERENCE

- [1] Alali, Liu, X and McLaughlin, J. L. "Annonaceousacetogenins: recent progress". *Journal of Natural. Products.* 1999; 62: 504-540.
- [2] Kalidindi N., Thimmaiah N.V., Jagadeesh N.V., Nandee R., Swetha S., Kalidindi B. "Antifungal and antioxidant activities of organic and aqueous extracts of *Annona squamosa* Linn." leaves. *J. Food Drug Anal.* 2015;23:795-802.
- [3] 1. Singh Y, Bhatnagar P, Thakur N. "A review on insight of immense nutraceutical and medicinal potential of custard apple" (*Annona squamosa* Linn.). *Int J Chem Sci [Internet].* 2019 Apr 1 [cited 2022 June 1];7(2):1237-45.
- [4] Bansal V.S., Bhatnagar P.K. Antihyperglycemic effect of "Annona squamosa hexane extract in type 2 diabetes animal model": PTPIB inhibition, a possible mechanism of action. *Indian J. Pharmacol.* 2012;44:326-332. doi: 10.4103/0253 7613.96304.
- [5] Bhattacharya A, Chakraverty R. The "pharmacological properties of *Annona squamosa* Linn": A Review. *IJPE.* 2016;4(2):692-699.
- [6] Mazahery, A. R. F., Dator, R. P., Concepcion, G. P. & Jacinto, S. D. Murihexocin C from the "Leaves of *Annona squamosa* Linn. Induces Apoptosis in Human Colon Carcinoma" *Col 2 Cell Line. Philipp Agric Sci* 92, 122–132 (2009).
- [7] Mazahery, A. R. F., Dator, R. P., Concepcion, G. P. & Jacinto, S. D. Murihexocin C from the "Leaves of *Annona squamosa* Linn. Induces Apoptosis in Human Colon Carcinoma" *Col 2 Cell Line. Philipp Agric Sci* 92, 122–132 (2009).
- [8] Kotkar, H. M. et al. "Antimicrobial and pesticidal activity of partially purified flavonoids of *Annona squamosa*". *Pest management science* 58, 33
- [9] Atique A, Iqbal M, Ghose, A K M. Use of *Annona squamosa* and *Piper nigrum* against diabetes. *Fitoterapia.* 1985; 56 (3): 190-192.
- [10] Topno KK, Plants used by tribals of Chotanagpur against diabetes, *Botanica.* 1997; 47: 99–101.
- [11] Gupta RK, Kesari AN, Murthy PS, et al. hypoglycemic and antidiabetic effect of ethanolic extract of leaves of *Annona squamosa* L. in experimental animals, *Journal of ethnopharmacology.* 2005; 99: 75–81.
- [12] Kaleem M, Medha P, Bano B, et al. Beneficial effects of *Annona squamosa* extract in streptozotocin-induced diabetic rats, *Singapore Medical Journal.* 2009; 49