WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 10, Issue 5, 970-989. Review Article ISSN 2277– 7105

A REVIEW ON PHARMACOLOGY AND PHYTOCHEMISTRY OF *ANNONA SQUAMOSA*

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Article Received on
05 March 2021,

Revised on 26 March 2021,
Accepted on 16 April 2021

DOI: 10.20959/wjpr20215-20378

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ABSTRACT

Natural remedies are used from ancient time for the treatment and welfare of human. Medicative plants square measure throught of to be effective and for many vital for the on top of functions. Annaona squamoa is that the best example of it. The fruit of this plant is often called dish apple that is eatable. The leaves square measure used as a vermicide, for treating cancerous tumors and square measure applied to abscesses, insect bites and different skin complaints. Scrapings of root-bark square measure used for ache. Pulverized seeds square measure wont to kill head-lice and fleas however care ought to be taken that the powder doesn't are available contact with the eyes as this causes nice pain. This review may be a sincere effort to place forward the medicative importance and chemical detail regarding the plant.

KEYWORD: Annona squamosa, Custard Apple, Pharmacology, Phytochemistry.

INTRODUCTION

Annona squamosa L., is also known as sitaphal, custard apple, sugar apple and sweet sops. It belongs to the family Annonaceae which consists of approximately 135 genera and 2300 species.[1,2] The geographical location of Annona squamosa is not clear. It is a semi-evergreen tree broadly distributed in tropical South America and in West Indies. The people of Spain carried seeds from the New World to the Philippines country and in the year 1590 portugeese introduced the sugar apple.[3] In present days, it is cultivated in tropical and sub-tropical regions worldwide.[4,5]

The height of Annona squamosa ranges from 3-8 m. Different shapes of leaf includes oblong lanceolate or lanceolate, 6-17 cm long and 3-5 cm, conversely arranged on short petioles; bark is thin and grey in color; greenish flowers and shoot elongates openly; different shapes of fruits includes round, heart-shaped, ovate or conical, 5-10 cm in diameter, with a lot of round protuberance; seeds are 1.3-1.6 cm long, oblong, smooth, shiny, blackish or dark brown.[6] The pulp of fruit having higher sugar content (58% of dry mass), so it is really sweet, hence the fruit pulp possess a high calorie value. This plant was reputed to contain number of medicinal properties.[7]

The preceding pharmacognostic evaluation made on the plant have proved that they possess different compounds like acetogenins which are responsible for anti-malarial, cytotoxic, anti-feedant and immunosuppressive activities. Diterpenes which were responsible for anti-HIV Principle and the anti-platelet aggregation activity are present. Apart from these partially purified flavonoids which were responsible for the anti-microbial and other pesticidal activities. Some lignans and hydroxyl ketones are also present in the plant.[8]

History

The past of herbal medicines starts from human advancement. The records of plants which are significant importance in ancient past, reveal that plants were used traditionally for medicinal purpose in India, China, Egypt and Greece. Sitaphal is popular name of the fruit. According to mythological information it is said that Lord Rama and Sita, during her vanvaas used to had this fruit. While another story says that during those days of vanvaas Ravana snatched Sita, in that situation the drops of her tears from her eyes gets fallen on the place where the origin of Stephan trees occurred.[9]

Synonyms

English- Sugar apple, Custard apple, Sweet sop

Bengali- Ata

Malayalam- Aathappazham

Hindi- Sitafal, Seetha pazham

Telugu- Seetha phalam.[10]

Taxonomic Classification

Annona squamosa L.

Kingdom- Plantae

Sub-Kingdom- Tracheobiota

Super-division- Spermatophyta

Division- Magnoliophyta

Class- Magnoliopsida

Sub-class- Magnoliidae

Order- Magnoliales

Family- Annonaceae

Genus- Annona L.

Species- Annona squamosa.[11]

Climatic conditions and Cultivation

The Annona squamosa requires a tropical climate but with a cool winters than those of west Coast of Malaysia. It grows rapidly in coastal lowlands of Ecuador at a height of 1500m. In Guatemala- it grows at a height below 4,000 ft (1,220m). In India-it grows at a height of about 4,000 (1,220m); In Ceylon-it may not be grown above 3,000 ft (915m). In Philippines it grows quite at a height below 2,600ft (800m). In southern Florida the trees still slumbered all over the winter season. Fully grown has live temperature of 27℃to 28° F without any serious harm. In significant cultivars are reported but there is considerable changein the quality of fruit from different trees.[12]

Morphological characters

Annona squamosa is a small semi-evergreen tree 3-7 m in height with a broad, random spreading branches, light brown bark with visible leaf scars and inner bark is light yellow and slightly bitter. The length and width of Leaves occur singly, 6-17 x 3-6 cm, shapes include lanceolate or oblong lanceolate.[13,14] The Leaf petioles ranges 0.6-1.3 cm long, green,

sparsely pubescent. Greenish-yellow Flowers, fragrant, having slender hairy stalks. Different shapes of fruits are heart shape, round, ovate or conical, 5-10 cm in diameter. The white pulp is edible and sweetly aromatic. Every carpel is fixed with a seed which is oblong, shiny and smooth, blackish or dark brown, 1.3-1.6 cm long.[15,16]

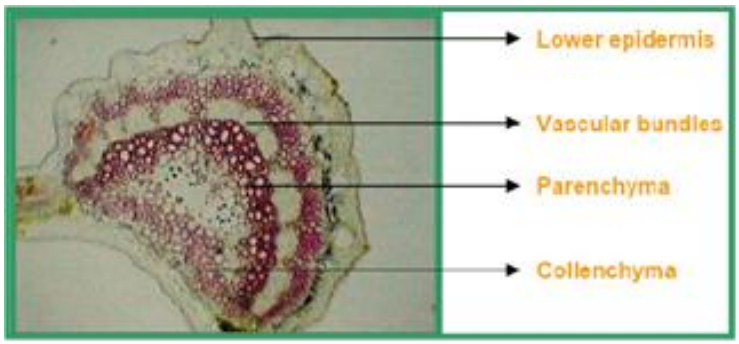
Table 1: Morphological characterization of Annona squamosa Linn.[17]

Characters	Color	Odor	Taste
Seeds	Black	Odorless	Tasteless
Leaves	Green	Characteristic odor	Characteristic
Stem	Green to brown	Characteristic	Slightly bitter
Roots	Light brown/Dark brown	Odorless	Bitter
Fruits	Greenish outside, pulp is white in color	Characteristic odor	Sweet

MICROSCOPIC STUDIES

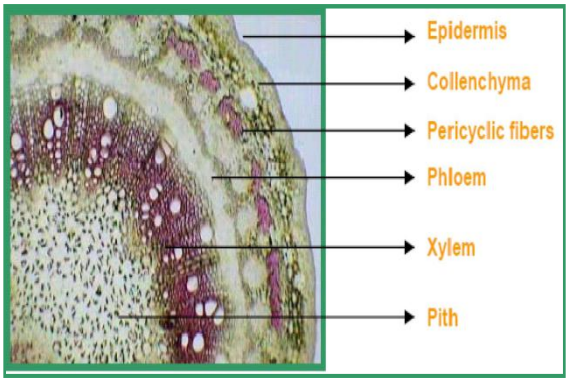
Leaf

Custard apple leaf is dorsiventral. Palisade cells are Single layer in nature located below upper epidermis. Paracytic type of stomata is present in lower epidermis. Mesophyll consists 3-4 layers of spongy parenchyma with more intercellular spaces. The collenchyma are present below epidermis on both surfaces at midrib portion. Parenchymatous cells are present in between collenchymatous and vascular bundles. The vascular bundle is lignified which are arranged in collateral open form. Sclerides are located below collenchymatous cells of upper epidermis.

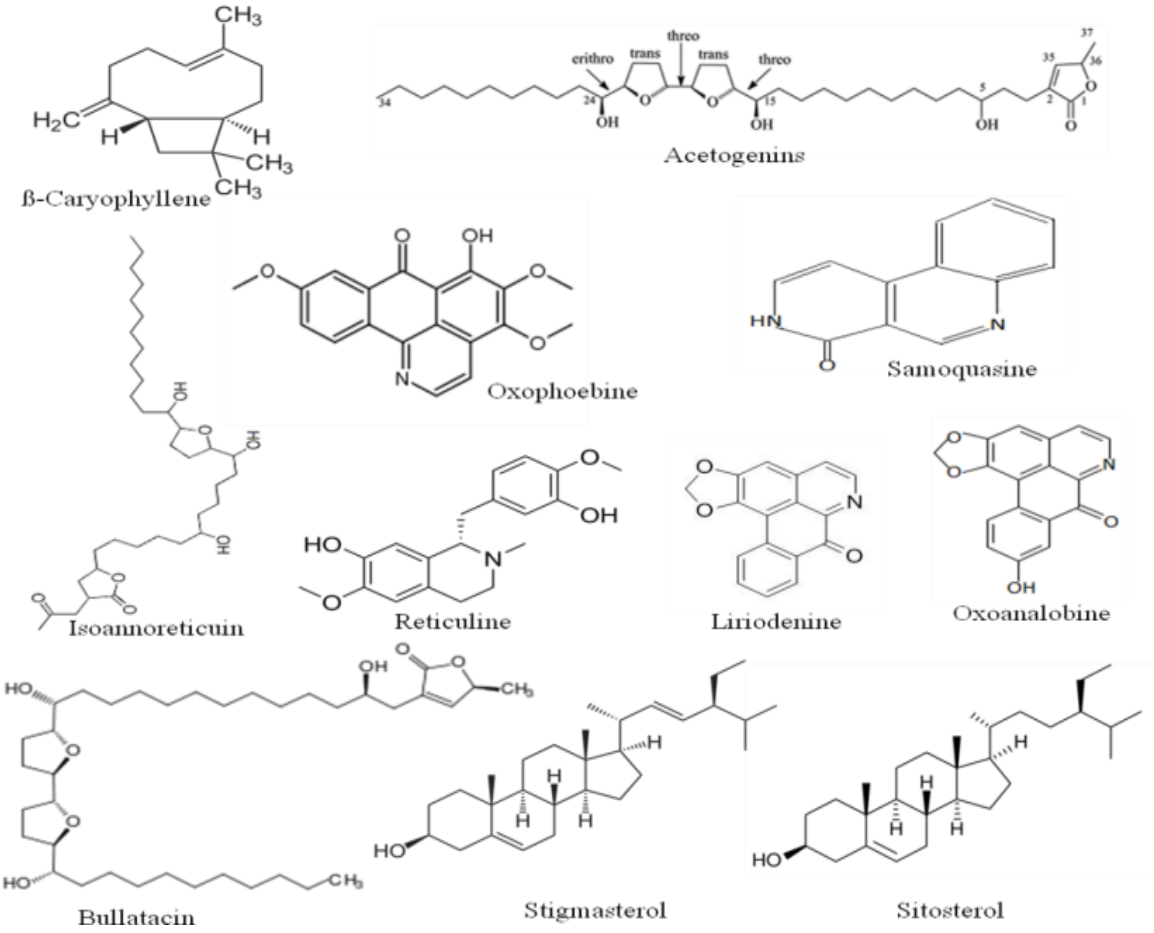


Stem

Cross section of stem shows that collenchymatous cells are present under epidermis, followed by pericyclic fibers, phloem (food conducting vessels), xylem (water conducting vessels) & parenchymatous cells. Xylem is surrounded by pith & starch grains which consists of lignified stone cells. Oval shaped starch grains are present which when treated with iodine solution turns to blue in color.[18]



Phytochemistry



The sugar apple is very sweet, containing sweeting agents like 28% sugar in which sucrose 2.53% dextrose 5.05% percent and laevulose 0.04% with aromatic flavours. It consists significant quantities of calcium, potassium, Vitamin C, iron, amino acid, niacin and ascorbic acid, carotene, riboflavin, magnesium and dietary fibres. Specific chemicals extractedincludealiphatic ketones like palmitone. Organic acids like purines, hexanoic and octanoic acid and.[19] Gas Chromatography –Mas Spectroscopy analysis of leaf oilyields 59 compounds. Most important components were β-caryophyllene (31.4%), δ-cadinene (6.7%),

α-murolene (5.5%), α-cadinol (4.3%) and isoquinoline alkaloids. The leaves and stems also gave alkaloids salsolinol, dopamine and coclaurine. Others are coryeline, anonaine, aporphine, isocorydine, norcorydine, and glaucine.[20]

The alkaloids isolatedfrom the plant was aporphine, protoberberine and tetrahydro isoquinoline. Other chemical components of plant are atidine, histisine, oxophoebine, reticuline, hetidine, heterophylline, isoatisine, hetisine, heterophyllisine, hetisinoneand benzoyl heteratisine. By using NMR Spectra we can easily identify compounds like liriodenine, oxoanalobine. The plant stem root extract containsdifferent chemical constituents like borneol, camphene, camphor, car-3-ene, carvone, β-caryophyllene, 16-hetriacontanone, hexacontanol, higemamine, eugenol, farnesol, geraniol, isocorydine, limonine.[21] Around 30 acetogenins were extracted from the seeds squamocins B to N, coumarinoligans, squamocin and cholesteryl, annotemoyin-1, annotemoyin-2, glucopyranoside. These compounds exhibit remarkable antimicrobial and cytotoxic properties.[22,23]

NUTRITIONAL VALUE

100 grams of edible portion of fruit consists of.[24]

Vitamin C	37gm
Calcium	17gm
Iron	4.37gm
Carbohydrate	23.5gm
Fibre	3.1gm
Protein	1.6gm
Phosphorus	47gm
Fat	0.4gm
Energy	104 Kcal

Uses

Annona squamosa contains cyclic peptides hence it is naturally used as anti-diabetic, antioxidant, as an insecticidal and antitumor agent, anti-lipidemic, and anti-inflammatory agent. An infusion with some of fresh leaves in 1 lit of water is prepared to fight against heart failure and palpitations (1 cup after meal) and also effective for proper digestion and has antispasmodic activities. The seeds possess anti-parasitic activity. In India the crushed leaves are used in antiulcer and wound healing. The tonic form of bark decoction used to halt diarrhoea. The leaves are used as febrifuge, tonic, cold remedy, digestive or to clarify urine and in rheumatic pain.[25]

Sitaphal churna is an ayurvedic treatment for cough, cold and sneezing nose.[26] Firewood yellow and brown dye colouring agents are prepared from the wood.[27]

Seeds contain anticancer compounds.[28] Leaf extract contain anti- nociceptive effect.[29] anticonvulsant activity is present in the roots.[30]

In Mexico country, the juice of custard apple is used for chills and fever.[31] Pulp has mutagenic property.[32] Annona squamosa used as decorative plant and it is cultivated along with banana plantation.[33] Leaves are used for treatment fainting spell,hysteria. Seeds contain insecticidal activity, parasitic activity.[34] Roots are reported to produce skeletal muscle relaxant effect. seeds showsympathetic action such as dilatation of pupil, decreases secretions, dryness of mouth and anti-tumour activity.[35] Fruits and fruit juice are taken for worms and parasites, to reduce fever, to increase mother's milk after childbirth, as an astringent for diarrhoea and dysentery.[36] Fruit of custard apple is employed in preparing ice creams and milk beverages.[37]

Toxicology

This is based on An investigation in 1999, the people suffered from atypical parkinsonism in Guadeloupe has a possible to consumption of fruits from Annonaceae family.[38] In additionally the people suffered with neurodegenerative tauopathy endemic in North America exhibited a strong link with the consumption of fruits containing ACGs.[39] Consequently ACGs, are considered as environmental neurotoxins led to neurological disorders, such as atypical Parkinsonism in north America.[40] Based on present research suggested the fruits of custard apple may be environmental neurotoxins as a source of exposure to ACGs.[41] In rats, annonacin (ACG) make ATP depletion and retrograded the transport of mitochondria to the cell soma, which make changes in the intracellular distribution of tau and resulted in some neurodegenerative diseases.[42]

Based on toxicity testing of extracts from sitaphal leaves and seeds was carry out on eyes and on ear skin of rabbits. The results that diethyl ether shows highest toxicity in eyes and petroleum ether extracts show the most poisonous on ear skin.[43] The toxicological evaluation of sitaphal root was tested on mice by oral administration. The report of the acute toxicity study treated 24 C. animal group did not show any toxic symptoms.[44] Annotemoyin-1 exhibit no toxic effects on Long Evan's rats, administered at 200 µg daily for 14 days.[45]

PHARMACOLOGICAL ACTION

1. Antidiabetic activity

The Male albino Wistar rats are used for evaluation of antidiabetic activity. Streptozotocin isinserted into male albino Wistar rats. Oral administration of Annona squamosa aqueous extract to diabetic rats for 30 days resulted in reduced blood glucose, urea, uric acid and creatinine but increased the activities of C-peptide, insulin albumin, albumin/globulin ratio and controlled the levels of all marker enzymes.[46]

2. Antihypertensive Activity

While a fraction of total ALKs from sugar apple was used to determine the antihypertensive activity.[47] The rats are used to study vasorelaxant effect by using the seed extract of A. squamosa 20 C which resulted in vasorelaxant effect of rat aorta. The bioactive compounds targeting aortic smooth muscle i.e., Cyclosquamosin B which was separated from seeds exhibited a hypotensive effect on rat aorta.[48]

3. Antiulcer activity

The compound namely 1-(4-β-D-glucopyranosyloxyphenyl)-2-(β-D-glucopyranosyloxy)-ethane was separated from the Annona squamosa twigs or branches of plants were subjected to screening for antiulcer activity. Models used for the screening were cold restraint, aspirin induced- pyloric ligation, alcohol induced-gastric ulcer and histamine induced duodenal ulcer. In this evaluation, omeprazole is used as standard drug after that result was compared. The result for the evaluation concluded anti-secretory activity in vivo through decreased total acidity and pepsin in pyloric ligation, which is confirmed by in vitro inhibition of H(+) K(+)-ATPase activity with corresponding reduction in plasma gastrin level.[49]

4. Antitumor activity

The defatted seeds of Annona squamosa was evaluated for the antitumor activity. In the extraction process aqueous and organic solvents are used. The parameters which were examined for the termination of the activity were asses of intracellular ROS, estimation of intracellular GSH, analysis of DNA fragment and quantization of apoptosis. The study was carried on rat histolytic tumour cells which lines AK-5. The study reported significant apoptotic tumour cell death with enhanced caspase-3 activity, down control of antiapoptotic genes Bcl-2 and Bcl. increased the generation of intracellular ROS which correlated with the reduced levels of intracellular GSH. Similarly DNA fragmentation and annexin-V staining confirmed that the extracts induced apoptosis in tumour cells was through the oxidative

stress. Aqueous extracts of custard apple seeds possess notable antitumor activity in vivo against AK-5 tumour.[50]

5. Antioxidant activity

The leaves of Annona squamosa was evaluated for the antioxidant activity. The chemical components were separated and was subjected to Infra-Red, Liquid Chromatography-Mass Spectrometry and the compound was confirmed to be of flavones on the basis of spectral data. The in vitro antioxidant activity of separated compound of Annona squamosa L was screened by free radical scavenging activity of dissimilar concentrations (10µg, 50 µg, and 100 µg) using 1, 1-diphenyl-2 picryl hydrazyl method (DPPH). The report of assay were then differentiated with synthetic antioxidant Butylated hydroxyl anisole (BHA).The separation compound show significant free radical scavenging activity.[51]

6. Hepatoprotective activity

Aqueous and alcoholic extract of leaves were used for the screening of hepatoprotective activity. The study was performed on Wistar strain of rats. Induction of experimental hepatotoxicity was induced using isoniazid and rifampicin, the standard drug silymarin was used for the reference. The result was significant increase in the level of total protein and also significant decrease in total bilirubin along with significant decrease in ALP, AST, ALT in the treatment group as compared to the hepatotoxic group. In the histopathological study the hepato-toxic group showed hepatocytic necrosis and inflammation in the centrilobular region with portal triaditis. The group of animal treated with extract showed minimal inflammation with moderate portal triaditis and their lobular architecture was normal. It should be concluded that extracts of Annona squamous were not able to cure completely hepatic injury induced by isoniazid and rifampicin, but it could restrict the effects of these drugs in liver.[52,53]

7. Vasorelaxant activity

Vasodilators are the medicinal components these used for the therapy of hypertension and cerebral vasospasm, and for the greater improvement of peripheral circulationacyclic octapeptide, cyclosquamosin B which was isolated from the seeds of dish apple was found to exhibit a possible vasorelaxant impact on the rat artery. The cyclosquamosin one of the main component in custard apple, which show the vasorelaxant activity.[54]

8. Antihelmintic activity

The anthelmintic activities of the Annona squamosa and its leaf extract have been stjdied using various models. The hexane, ethyl acetate, ethanolic extracts of the crude drug at different concentrations were tested which involve determination of paralysis time and death time.[55,56]

9. Anti-Bacterial and Wound Healing Activity

In the above study leaves of the plant were thoroughly extracted by Soxhlet equipment with completely different solvents like oil ether, solvent ether, chloroform, alcohol and chloroform water in ascending order of the polarity. All the 5 extracts were subjected to antibacterial screening by using the cup plate technique. The petroleum ether, alcoholic and chloroform water extract showed most zone of inhibition. Therefore these extracts were taken for wound healing activity. The petroleum ether extracts of custard apple leaves were utilized in all models showed vital results. All the results were vital for various parameters in wound healing activity when compared with management cluster.[57]

10. Anti-arthritic, Anti-inflammatory and Analgesic Activity

The above activities were screened using combined extract of custard apple tree and nigella sativa was evaluated and validated in numerous animal models. Arthritis disease was induced by Complete Freund`s Adjuvant (CFA) injection in metatarsal footpad of Sprague-Dawley rats. Degree of inflammation was evaluated by hind paw swelling and body weight, estimation of AST, angular position and TP supported by histopathology of knee joint. The results of mixed extract wassignificant decrease in paw volume, increase body weight and reduction in elevated levels of angular position, AST and TP. For antiarthritic activity the histopathological reviled the actual fact that there was vital reduction in neutrophils infiltration, pannus formation and bone of the animal treated with plant extract. The extract reviled that it has analgesic and anti-inflammatory activity in dose dependent manner when compared to comparable with the reference standard drugs, pethidine sulphate and indomethacin.[58]

11. Anti-platelet Activity

The ent-kauranedi-terpenoids, that are isolated from stem of sweetsop Linn. are investigated for anti-platelet activity. The ent-kauranedi-terpenoids ‘ent-Kaur16-en-19-oic acid’ and ‘16alpha-hydro- 19-al-ent-kauran-17-oic acid’ showed complete restrictive effects on rabbit platelet aggregation at 200µm.[59]

12. Antifertility Activity

The seed extract of sweetsop Linn. was investigated for post coitus antifertility activity. The seed extract of plant Linn shows anti-implantational and abortifacient activities.[60]

13. Stress and Depression

Sitaphal is alleged to be an honest supply of vitamin B complex that helps in controlling GABA neuron chemicals within the brain. Thisrelaxes the mind and helps to quiet down stress, tension, irritability and depression.[61]

14. Antimalarial activity

The significant activity demonstrated by extracts of Annona squamous suggests that the two plants may have strong killing effects against insects particularly mosquitoes, hence giving a promising source of larvicidal agents. The EtOAc fractions of plant were the most active principles in the EtOAc fraction further larvicidal testing of the three sub fractions Sq-1, Sq-2, Sq-3 for plant showed a dose dependent ($p > 0.05$). but also significantly a decreased activity from its parent fraction at the same concentration levels. This indicates that, several medium polar compounds in the extract are acting synergistically or competitively at the active sites. Plant collected from brazil indicated larvicidal effect against Aedes adopictus and C.quinquefascinitis and against Anopheles stephensi. Present larvicidal activity result supports the reports and demonstrated that extract of Annona squamosa species are potential anti-mosquito agents. In the recent studies on Annona squamosa all compounds showed moderate activity against a chloroquine sensitive strain and a chloroquine resistant strain of Plasmodium falciparum.[62]

15. Antimicrobial activity

The antimicrobial activity was evaluated using four solvent extract. Agar diffusion methodology was hand-picked to checkantimicrobial activity. 2 Gram positive (Staphylococcus aureus and bacillus subtilis) and 2 Gram negative (Escherichia coli and Pseudomonas aeruginosa) bacteria were hand-picked for screening. The screening results showed that highest zone of inhibition was observed in methanol extract against Aeruginosa (MIC: 130µg/ml) followed by petroleum ether extract against aeruginosa (MIC: 165 µg/ml) and methanol extract against E. coli (MIC: 180 µg/ml) (63). To judge the medicine activity another study was performed using 3 totally different solvent extracts of leaf of custard apple tree L. and bullock's heart L. Agar cup and broth dilution strategies were hand-picked to check medicine activity using 3 gram-positive (Bacillus subtilis, Staphylococcus aureus and

coccus epidermidis) and 5 gram-negative (Escherichia coli and Pseudomonas aeruginosa, typhoid bacillus, vibrio alginolyticus, vibrio cholerae) bacteria. The screening results showed that highest inhibition was ascertained by the methanol extract followed by petroleum ether and aqueous extracts for each custard apple tree and bullock's heart leaf. hay bacillus, coccus epidermidis, coccus aureus and vibrio alginolyticus square measure the foremost sensitive microorganism strains among all take a look at organisms. None of the plant extracts showed growth of inhibition against typhoid bacillus.[64]

16. Insecticidal activity

The common Musca domestica (Diptera: Muscidae) that is a vital mechanical vector of many microorganism and infective microbes of human and animals which became immune to the chemical pesticides. Annonaceous acetogenins that were extracted from the tree leaves, bark and seeds possess the insect anti-feedant properties. The ethanolic extracts of A. squamosa leaves against the Musca domestica was evaluated and was found that the LC50 values of the extract was found to be of around 282.5 and 50 mg/l. the info obtained instructed that the leaf extracts of the above plant may be used because the probable candidates within the development of bioinsecticides so as to regulate the population of Musca domestica for safer and economic various to the artificial insecticides.[65] Crude ethanolic seed extracts of A. squamosa was additionally screened for his or her inhibition of larval growth against the polyphagous lepidopteron genus Spodoptera litura (Noctuidae) within which the extracts considerably showed additional active (20-fold) insecticidal impact.[66]

17. Cytotoxic Activity

Two new compounds are isolated and were evaluated for the above activity. The custard apple seed extract was used for the separation of the compound. The study was carried out against HCT, human respiratory organ cancer (A-549), human breast cancer (MCF-7), and human prostate adreno carcinoma (PC-3) with adriamycin as positive standard using MTT method.[67]

18. Anti- HIV

There was a positive result exhibited by the extract of Annona squamosa once evaluated for anti- HIV screening. In the above study new substance have been named and isolated. The structures of the new compounds were established by spectral analyses and chemical proof. Among the 14 isolated compounds within the study, 16β,17-dihydroxy-ent-kauran-19-oic

acid showed vital activity against HIV replication in H9 lymphocyte cells with AN EC_{50} price of zero.8 µg/mL.[68]

19. Anti-genotoxic Effect

The antigenotoxic effects of aqueous and ethanolic bark extracts of custard apple was assessed by determining the frequency ofmicronucleated polychromatic erythrocytes (MnPCEs) and chromosomal aberrations. Oral administration of binary compound and ethanolic bark extracts considerably reduced thefrequency of MnPCEs and chromosomal aberration in DMBA treated hamsters. Although eachextracts have shown anti-genotoxic effects, the results of ethanolicextract was found to be additional prominent than the aqueous extract. The present study demonstrates the anti-genotoxic effects of plant's bark extracts in DMBAinduced genotoxicity in Golden Syrian hamsters. Studies on the genotoxicity potential of plant have shown that the plant extract treatment considerably alteredserum enzyme levels in oxidative stress conditions.[69]

20. Antithyroidic Activity

The methanolic extract of seeds of custard apple tree Linn. shows ameliorative impact within the regulation of hyperthyroidism in mouse model. Hyperthyroidism produced by L-Thyroxine (L-T4) administration (0.5 mg/kg/d for twelve days, i. p.), that magnified the degree of blood serum T (T3) andthyroxine (T4), activity of viscus G-6-Phospatase, 5'-mono-deiodinase (5'DI) and peroxidation (LPO) with a parallel decrease in enzyme superoxide dismutase (SOD) andcatalase (CAT) activities. However, simultaneous administration of the Annona seed extract (200 mg/kg) to L-T4 induced hyperthyroid animals for ten days reversed of these effectsindicating their potential within the regulation of thyrotoxicosis. Further, the seed extract didnot increase, however decreased the hepatic LPO suggesting its safe and anti-peroxidative nature.[70]

21. Prevents Ageing

Sitaphal contains L-lysine and L-proline, the amino acids that facilitate to make collagen within the body. Collagen is a substance that providesstructure and elasticity of the skin tissues. The high levels of antioxidants in dish apple defend the cell membranes from the radical harm, permitting thebody to fight the signs of ageing. Sitaphal boosts the expansion of new cells, creating the skin look young. It helps to prevent the discoloration and wrinkles associated with ageing. It additionally tones and firms the skin stars. Sitaphal is additionally useful in increasing the production of breast milk after the parturition.[71]

22. Anti-hyperlipidemic Activity

This study shows the result of Polyherbal formulation of sweetsop on blood sugar, plasma hypoglycemic agent, tissue lipid profileandlipid- peroxidation in streptozotocin induced diabetic rats. Aqueous extract of Polyherbal formulation of the plant fruit was administered orally (200 mg/kg bodyweight) for thirty days. The different doses of polyherbal formulation on blood sugar and plasma insulin in diabetic rats were studied and the levels of lipid peroxides and tissue lipidswere also calculable in streptozotocin induced diabetic rats. The consequences were compared with hypoglycemic agent. Treatment with Polyherbal formulation and tolbutamideresulted in reduction of blood sugar and increase in plasma hypoglycemic agent. Polyherbal formulation additionally resulted in decrease in tissue lipids andlipid peroxide formation. The reduced lipid peroxides and tissue lipids clearly showed the anti-hyperlipidemic and antiperoxidative result of polyherbal formulation apart from its anti-diabetic effect.[72]

23. Larvicidal Activity

Mosquitoes possess an excellent threat to the human health by means of the transmission of the intense diseases. Development of the resistance, cross-resistance, and also rising price additionally because the possible toxicity hazards arisesto the artificial pesticides usage were a number of the explanations lead tothe interest within the discovery of plant primarily based merchandise within the recent years. The larvicidal and also the growth control activities of custard apple tree was reportedagainst A. stephensi and alternative mosquitoes. The high efficiency of custard apple tree as a chemical against two-winged insects species was evaluated but the activecompound that possess a cytotoxic substance against the larval species has to be identified.[73]

24. For A Stronger Digestive System

It flushes out the toxins from the intestine, aiding in correct functioning of the bowels. It also prevents abdomen connected diseaseslike heartburn, ulcer, gastritis and acidity. This delicious fruit is incredibly effective for treating indigestion. Custard apple in its unripe form is dried and crushed totreat diarrhoea and infectious disease. One medium sized dish apple contains 6 grams of dietary fiber, amounting to almost 90% of the recommended amount. Fiberadds bulk to the stools, relieving constipation.[74]

CONCLUSION

Indian literature like piece of writing and numerous ancient literature have already mentioned flavorer correction for variety of human ailments. Sweetsop tree which is often referred to as dish apple in English and sitapal in Hindi having numerous medicine activity such as analgesic, anti-inflammatory, wound healing. antiprotozoal drug, cytotoxic, anti oxidizer, anti microorganism, and few additional. Some compound are isolated and reportable from the extract of assorted a part of the plant possessing sensible pharmacological activity. The studies performed on the seed extract additionally proven for Anti-HIV activity and reporting with new isolated compound. More pharmacological investigation ought to be performed using latest technique to get the potential of the plant.

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