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REVIEW ON HIBISCUS PLANTIFOLIUS

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ABSTRACT:

Medicinal plants or botanical medicines have been used traditionally by mankind for the prevention and treatment of various ailments. The plant kingdom plays a vital role in the life of human beings and animals. The plants are the major source of various compounds that are widely used in pharma industries and other nutraceutical sectors. *Hibiscus Plantifolius* is a climber under Malvaceae family. This is one of the much unexplored medicinal plants. The present work has been taken up to review the plant *Hibiscus Plantifolius* focusing on its taxonomical, pharmacological, chemical, biochemical, and ethno medicinal uses and to contribute this knowledge for further extensive studies on this plant.

Key words: *Hibiscus Plantifolius*,Malvaceae,nutraceutical,ailments

INTRODUCTION:

Medicinal plants have been a part of the human life for thousands of years. The rise in population, inadequate supply of drugs, side effects of allopathic medicines, resistance to drugs and high cost treatments have made human beings to use plant as a source of medicine for a variety of diseases. Green plants which are usually the reservoir of many biochemical products can be extracted and used for various scientific experiments thus leading to the development of plant based non-toxic, non-reactive product.[1-2]

Hibiscus platanifolius Linn (Malvaceae) known as Maple leaved mallow is an important medicinal plant. It is an evergreen tree, growing up to 10 m tall. Leaves are alternate, simple, stipulate, petiolate and ovate to lanceolate, often with a toothed or lobed margin. Leaves are usually 3-5 lobed, 6-12 × 5-12 cm. Leaf are palmetely veined, entire or various lobed. Flowers are pale pink, with each petal having a deep pink base. Flowers are about 3-5 inches across. Sepals are leathery, hairy. Stamen-column is 2-2.5cm long, pale pink. Maple leaved mallow is native to India. This is well known in Asia and Africa and is commonly used more widely as a natural source of food coloring and used to make wigs. [3-5] The bark of Hibiscus contains strong baste fibers, these fibers used for making grass skirts. In ayurvedic literature of India, different parts of this plant have been recommended as remedy for various ailments like hyperlipidemic, diabetes, hypertension, liver disorders and as antidotes to poisoning chemicals. Hibiscus petal is used to stimulate thicker hair growth and to prevent premature graying, hair loss and scalp disorders. It acts as a natural emollient hair conditioner and can be used in hair washes and vinegar rinses for the hair. A number of active principles from this plant have been identified which include taraxeryl acetate, beta sitosterol, campestral, stigma sterol, cholesterol, erogosterol, lipids, citric, tartaric and oxalic acids, fructose, glucose, sucrose, flavonoids and flavonoid glycosides. However there is no exclusive report on the medicinal values of the leaves of Hibiscus platanifolius Linn.

PLANT PROFILE:

Hibiscus platanifolius, the **maple-leaved mallow**, is a species of flowering tree in the mallow family, Malvaceae, that is native to the India and Sri Lanka. In Sri Lankan texts, the plant is widely known by its synonym *H. eriocarpus*. The tree is about 8m tall. Leaves are cordate at base; hairy; trilobed. Flowers show axillary panicles where flowers show typical *Hibiscus* flower colors, pink with dark center. Fruit is a capsule.

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

Vernacular Names:
Common name : Wild Hibiscus, Hill Hemp Bendy
Malayalam : Njaaranpuli / Panichakam
Hindi : Van gurhal
Tamil :Malai-p-puliccai
Telugu :Adavigogu, Kondagogu
Kannada : Betta bende
Gujarati : Majnu phal
Marathi : Kateri bhendi

Taxonomical classification
Kingdom : Plantae
Sub Kingdom :Tracheobionta
Super division : Spermatophyta
Division :Magnoliophyta
Class : Magnoliopsida
Sub class :Dilleniidae
Order :Malvales
Family : Malvaceae
Genus : Hibiscus
Species :*Hibiscus plantifolius*

MEDICINAL USES OF SOME IMPORTANT HIBISCUS SPECIES:

In ayurvedic literature of India, different parts of this plant have been recommended as remedy for various ailments like hyperlipidemic, diabetes, hypertension, liver disorders and as antidotes to poisoning chemicals. Hibiscus petal is used to stimulate thicker hair growth and to prevent premature graying, hair loss and scalp disorders. It acts as a natural emollient hair conditioner and can be used in hair washes and vinegar rinses. A number of active principles from this plant have been identified which include taraxeryl acetate, beta sitosterol, campestral, stigma sterol, cholesterol, erogosterol, lipids, citric, tartaric and oxalic acids, fructose, glucose, sucrose, flavonoids and flavonoid glycosides. However there is no exclusive report on the medicinal values of the leaves of *Hibiscus platanifolius Linn*.

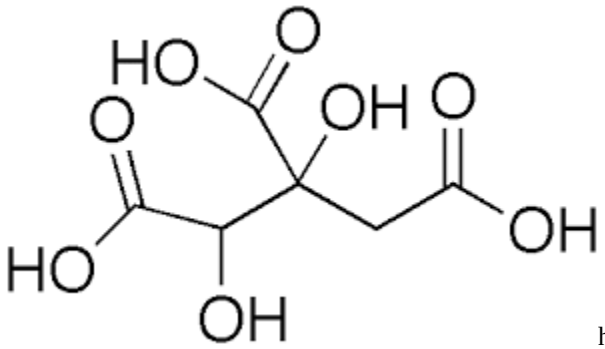
Hibiscus species are medicinally important and many of the species are scientifically evaluated for their antioxidant and antibacterial activities. The biological activities of some hibiscus species (10) are mentioned in below table

S.no	Name of the hibiscus spieces	Parts used	bioactivity
1	Hibiscus rosasinensis	Leaf,flower,stem,root	Anticancer,antioxidant,antibacterial
2	Hibiscus sabdariffa	Leaf,seed,calyx,fruit	Anticancer,antioxidant
3	Hibiscus plantanifolius	Leaf	Antibacterial,antifungal,antioxidant,hypoglycemic
4	Hibiscus mutabilis	Leaf	Antioxidant
5	Hibiscus esculentus	Seed	antibacterial

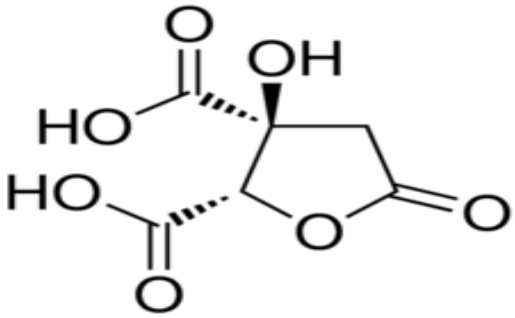
CHEMICAL COMPOSITION OF THE PLANT

The leaf of Hibiscus plantanifolius shows the presence of Hibiscus acid, the chemical name being Tetrahydro-3-hydroxy-5-oxo-2, 3 -furandicarboxylic acid. The optical isomer of hydroxycitric acid, Garcinia acid is also an important organic acid present in the plant giving it the medicinal properties (19, 20). The plant is also a rich source of triterpene and flavanoid compounds like hibiscatin and gossyptrin which is giving the plant its antioxidant properties (21). The plant also contains various acids like Citric acid, Malic acid, Tartaric acid and allo-hydroxycitric acid lactone (Hibiscus acid). The Flowers of the plant reported the presence of gossypin, gossypitrin and hibiscatin. The plant also found to contain alkaloids, anthocyanins and quercetin. All these phytochemicals present in hibiscus plantifolius contribute to the medicinal properties.

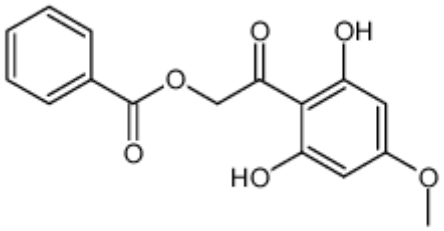
ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021



hydroxy citric acid



Garcinic acid



Hibiscatin

PHARMACOLOGICAL ACTIVITIES:

1 .IN VIVO ANTIOXIDANT ACTIVITY

The methanolic extract of *Hibiscus plantifolius*was evaluated for antioxidant activity against paracetamol-induced hepatotoxicity in rats. Liver antioxidant enzymes levels are assessed to study antioxidant property of this plant. In the present study, paracetamol administration caused a marked depletion of tissue GSH level with reduced activities of liver antioxidative enzymes like SOD and CAT.

At high doses, paracetamol produces acute toxic effects which lead to liver damage. The drug is bioactivated to a toxic electrophile, *N*-acetyl *p*-benzoquinone imine (NAPQI), which covalently binds to tissue macromolecules, probably oxidizes lipids, or the critical sulfhydryl groups (protein thiols) and alters the homeostasis of calcium4. Massive production of reactive species may lead to depletion of protective physiological moieties (glutathione and α-tocopherol, etc.), causing damage to the macromolecules in vital biomembranes and liver injury.

Antioxidant enzymes are involved in scavenging superoxide anion to form hydrogen peroxide, hence reducing the toxic effect caused by these radicals. SOD and CAT are important enzymes in the enzymatic antioxidant defense system. Decreases in their activities may result in a number of deleterious effects. In this study, it was observed that *MEHP* extract significantly ($p<0.05$) increased hepatic SOD and CAT activities in paracetamol-induced liver damage in rats. This showed that *MEHP* can reduce reactive free radicals, thereby reducing oxidative damage to the tissues besides improving the activity of hepatic antioxidant enzymes.

Glutathione (GSH) is one of the tripeptide and non-enzymatic biological antioxidants present in high quantities in the liver. It helps to remove free radical species such as hydrogen peroxide, superoxide radicals, alkoxy radicals and maintain membrane protein thiols, and serves as a substrate for glutathione peroxidase and glutathione transferase8. Reduced level of GSH is implicated in the enhancement of lipid peroxidation in paracetamol-treated rats. Pretreatment with *MEHP* stem extract significantly increased the level of GSH in a dose-dependent manner portraying its ability to scavenge these free radicals.

IN-VITRO ANTIOXIDANT ACTIVITY

The methanolic extract of *Hibiscus plantifolius*was evaluated for invitro antioxidant activity against DPPH* free radical scavenging activity, NO* free radical scavenging activity,Superoxide Anion (SO*) free radical

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

scavenging activity, Hydrogen Peroxide (OH*) Free Radical Activity. In DPPH* free radical scavenging activity, Each concentration of one ml of was mixed with 3 ml of aDPPH-methanol solution (40µg/ml) .This was kept for20 minutes for the reaction to occur. Then the absorbance was determined at 517 nm and calculates the percentage of inhibitions using the following equation:

% inhibition = [1- (Ab. of Ssample / Ab. of control)] x 100.

In DPPH scavenging activity8, all the extracts showed concentration-dependent activity

In NO* free radical scavenging activity, One ml of each concentration of test sample was taken and tothis add 1ml of Sodium nitroprusside solution. This solutionwas incubated at 37oc for 3 hours. Add 0.3ml of Griess reagentto above 1 ml of aliquot of incubation solution. Theabsorbance was measured at 570 nm using UV SPECTROPHOTOMETER

In Superoxide Anion (SO*) free radical scavenging activity, Super oxide radicals are generated in PMS-NADH systems by oxidation of NADH and assayed by the reduction of nitro bluetetrazolium (NBT).In this experiments, the superoxide radicals were generated in 3ml of Tris-HCI buffer (16 mM, pH 8.0) containing I ml ofNBT (50 mM) solution, 1 ml NADH (78 mM) solution and sample solution of different concentration of MEHP in water.

These all contents were mixed. The reaction was started by adding 1 ml of phenazine methosulphate (PMS) solution (10mM) to the mixture.The reaction mixture was incubated at 25°C for 5 minutes, and the absorbance at 560 nm in a spectrophotometer wasmeasured against blank samples. Curcumin was used as acontrol..

In Hydrogen Peroxide (OH*) Free RadicalActivity, Different concentrations of extract were dissolved of 0.lM phosphate buffer (having pH 7.4) and were mixed with 600 µL of 43 mM solution of hydrogen peroxide (30%). The absorbence value at 230 run of the reaction mixture was recorded at 10 min intervals between zero and 40min for each concentration.

Many scientific studies are revealed that the antioxidative activity of herbal plants due to presence of phytochemicals such as flavonoids and saponins & in order to ascertain whether there is any link between the Methanomedicinal applications of Hibiscus plantifolius and its antioxidant activities, different methods were employed to evaluate the free radical scavenging and antioxidant activities of methanol extract agents for thousands of years and an impressive number of modern drugs have been developed / isolated natural resources, may based on their use in traditional of stem of Hibiscus plantifolius (MEHP). Current investigation reported that selected plants extracts such as methanolic extract of Hibiscus plantifolius neutralization of DPPH*, NO*, SO* and OH* free radicals and also activity compared with standard curcumin.

3.HEPATOPROTECTIVE ACTIVITY:

The ethanolic extract of *Hibiscus plantifolius*was evaluated for hepato protective activity against Rifampicin induced hepatotoxic rats**.**

Estimation of Serum Marker Enzymes

During hepatic damage, cellular enzymes like AST, ALT and ALP present in the liver cells leak into the serum, resulting in increased concentration. Rifampicin administration for 9 days significantly increased all these serum enzymes. Serum levels of SGPT can increase due to damage of the tissues producing acute hepatic necrosis, such as viral hepatitis and acute cholestasis. Rifampicin induced liver damage and alcoholic cirrhosis also can associate with mild to moderate elevation of transaminases. In the current study treatment of rats with ethanolic extract of whole plant of *Hibiscus platanifolius* significantly ($p<0.01$ in 200 mg/kg b.w. and $p<0.01$ in 400 m/kg b.w) decreased the levels of SGPT in serum which is an indication of hepatoprotective activity. SGOT is a mitochondrial enzyme released from heart, liver, skeletal muscle and kidney. Liver toxicity elevated the SGOT levels in serum due to the damage to the tissues producing acute necrosis, such as severe viral hepatitis & acute cholestasis. In the current study treatment of animals with ethanolic extract *of Hibiscus platanifolius* significantly ($p<0.01$) decreased the levels of SGOT in serum which is an indicative of hepatoprotective activity. In case of toxic liver, alkaline phosphatase levels are very high, which may be due to defective hepatic excretion or by increased production of ALP by hepatic parenchymal or duct cell. In the current study treatment of animals with ethanolic extract of *Hibiscus platanifolius* significantly ($p<0.01$ in 200 mg/kg b.w. and $p<0.01$ in 400 mg/kg b.w) decreased the levels of ALP in serum as an indication of hepatoprotective activity.

Direct and Total Serum bilirubin

In case of toxic liver, bilirubin levels are elevated. Hyperbilirubinemia can result from impaired hepatic uptake of unconjugated bilirubin. Such a situation can occur in generalized liver cell injury. Certain drugs (e.g., rifampin and probenecid) interfere with the net uptake of bilirubin by the liver cell and may produce a mild unconjugatedhyperbilirubinemia. Bilirubin level rises in diseases of hepatocytes, obstruction to biliary excretion into duodenum, in haemolysis and defects of hepatic uptake and conjugation of bilirubin pigment such as in Gilbert's disease. In the current study treatment of animals with ethanolic extract whole plant of *Hibiscus*

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platanifolius significantly ($p<0.01$ in 200 mg/kg b.w. and $p<0.01$ in 400 mg/kg b.w) decrease the levels of bilirubin (direct and total) in serum which is an indication of hepatoprotective activity.

Cholesterol and Total protein

A direct relationship exists between your liver function and cholesterol levels. In fact, liver problems can lead to elevated cholesterol levels in blood and vice versa. One of the major functions of liver is to produce bile, a fluid that helps to digest fats and process cholesterol, If liver damage or inadequate liver function, this function could become impaired, increasing your cholesterol levels. This can lead to a buildup of fat and cholesterol in liver and blood.Conversely, excessively high cholesterol levels in blood can contribute to liver damage as well. High cholesterol levels can lead to a buildup of fat in liver, potentially causing nonalcoholic steatohepatitis, or NASH, also called "fatty liver disease," Although high cholesterol can contribute to NASH, other liver conditions can cause elevated cholesterol levels. For example, liver diseases such as alcoholic hepatitis and cirrhosis can lead to high cholesterol. In the current study treatment of animals with ethanolic extract of *Hibiscus platanifolius* significantly ($p<0.01$) decreased the levels of Cholesterol in serum which is an indicative of hepatoprotective activity.

Total protein and albumin levels are low; this can be an indication of certain underlying health conditions. Although the two main proteins are albumin and globulin, albumin is the major protein found in blood plasma. Produced in the liver, albumin has many functions in the body, including the transportation of substances such as hormones and medications. Total protein test and an album in serum test can measure the amounts of blood proteins. A blood test that shows low levels of albumin can be an indication of liver damage or disease. Liver dysfunction associated with decreased albumin levels includes diseases such as hepatitis. Ascites or swelling of abdomen may develop if you have low albumin levels are associated with liver disease. Decreased albumin levels may also suggest kidney diseases or disorders, including glomerulonephritis. With a kidney disorder such as glomerulonephritis, albumin is lost from body through urine, which can lead to decreased protein levels. In thIS study treatment of animals with ethanolic extract of *Hibiscus platanifolius* significantly ($p<0.01$) increased the levels of proteins in serum which is an indicative of hepatoprotective activity.

The methanolic extract of *Hibiscus plantifolius*was evaluated for hepato protective activity against paracetamol – induced hepatotoxic rats. The serum glutamate oxaloacetate transaminase (SGOT) and serumglutamate pyruvate transaminase (SGPT) and alkaline phosphatase (ALP) and total bilirubin assessed to study the hepatoprotective activity of the plant and were compared with standard drug.

Hepatocytes are the main components of liver which regulates various metabolic activities and their distortion leads to disorder in body metabolism. At high doses, paracetamol produces acute toxic effects which lead to liver damage. The drug is bioactivated to a toxic electrophile, *N*-acetyl *p*-benzoquinone imine (NAPQI), which covalently binds to tissue macromolecules, probably oxidizes lipids, or the critical sulfhydryl groups (protein thiols) and alters the homeostasis of calcium Massive production of reactive species may lead to depletion of protective physiological moieties (glutathione and α-tocopherol, etc.), causing damage to the macromolecules in vital bio membranes and liver injury.

Silymarin forms a complex that hinders the entrance of toxins into the interior of liver cells and metabolically stimulates hepatic cells and activates the RNA biosynthesis of ribosomes to stimulate protein formation. It is most frequently used natural compound all over the world due to its anti-toxic, anti-oxidant, anti-inflammatory, anti-fibrotic activities compounds. It is an easily available plant for natural remedies

4.HYPOLIPIDEMIC ACTIVITY

A significant decrease ($p<0.001$) in the cholesterol,triglycerides levels were observed. Ethanol and aqueous hotextracts controlled the elevation of lipid profiles, cholesterol and triglyceridessignificantly in comparison with thestandard control Glibenclamide. Hyperlipidemia is a recognized complication of diabetes mellitus characterized

by elevated levels of cholesterol, triglycerides and changes in lipoprotein composition. A marked increase in serumcholesterol and triglycerides levels was observed in diabetic rats. Treatment with Ethanol and aqueous hot extracts of*Hibiscus platanifolius* reduced the cholesterol and triglycerides level. Ethanolic and aqueous hot extracts of *Hibiscus platanifolius* exhibited significant anti hyperglycemic andantihyperlipidimic activities in alloxan induced diabetic rats. Ethanolic extracts showed H2O2 radical scavenging activity and reducing power assay in rats

5.HYPOGLYCEMIC ACTIVITY:

The rats were injected intraperitoneally with alloxan monohydrate dissolved in sterile normal saline at a dose of. 150 mg/kg body weight. After 2 weeks, rats with moderate diabetes having glycosuria (indicated by Benedict'squalitative test) and hyperglycemia (i.e. with a blood glucose of 200-300 mg/dl) were used for the

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experiment.Blood glucose, triglycerides, cholesterol, HDL-cholesterol,LDL-cholesterol and total proteins were estimated from the
serum by using standard kits. The induction of alloxan diabetes is as follows
Group-I - Normal control rats, Group-II - Diabetic control rats, Group-III - Diabetic rats received standard drug,Glibenclamide (0.5 mg/kg) for 28 daysGroup-IV - Diabetics rats received aqueous hot extract(100 mg/kg) for 28 days, Group-V - Diabetics rats received aqueous hot extract(150 mg/kg) for 28 days, Group-VI - Diabetics rats received ethanol extract (100mg/kg) for 28 days, Group-VII - Diabetics rats received ethanol extract (150
mg/kg) for 28 days. The blood samples were drawn on 7th, 14th, 21st and 28th day from the retro orbital venous plexus of rats under etheranaesthesia using a glass capillary tube after a fast of 12 hours and the blood was centrifuged (2,500 rpm/10min) to getserum. The serum was used for biochemical estimation of blood glucose, triglycerides, cholesterol, HDL-cholesterol,LDL-cholesterol and total proteins. After 28 days the rats were sacrificed, pancreas and liver were harvested andimmediately frozen in liquid nitrogen for biochemical estimation.In animals treated with alloxan (150 mg/kg i.p) to group-II, a significant increase in the serum glucose levels was observed on the 7th, 14th, 21st and 28th day, when compared to thenormal group (Group-I). Group-III treated with standard drug (Glibenclamide-0.5 mg/kg p.o) showed a significant decrease in serum glucose levels on 7th, 14th, 21st and 28th day, when compared to the diabetic control group (Group-II). On administration of aqueous hot and ethanolic leaf extracts at different doses (100mg and 150mg/kg) i.e., Group-IV, V, VI and VII, the blood glucose levels were decreased on 7th, 14th, 21st and 28th day, when compared to the control group (Group-II). So the result revealed that, the ethanolic and aqueous hot extract at dose of 150mg/kg has more significant anti-diabetic activity compared to ethanolicand aqueous hot extract at dose of 100 mg/kg

6. ANTI ARTHRITIC ACTIVITY

In a study the anti–arthritic activity of leaves of *Hibiscus platinifoliuslinn* have been investigated on male Wister rats and estimation of paw edema, body weight measurement and measurement of activity of marker enzymes like alanine trans aminases (SGPT) and serum glutamate oxalo acetate transferases (SGOT) in serum by using Aqueous extract of *Hibiscus platinifolius* line. The study of anti–arthritic activity involves induction of arthritis to rats of all groups using FCA and turpentine oil induced in i.p route, followed by subsequent treatment with aqueous extraction at two different doses. i.e AEHP 200mg/kg and AEHP 400mg/kg respectively. Diclofenac sodium is used as a reference standard. paw edemas, paw height, paw volume were estimated from the serum by using Freund's complete adjuvant (FCA) and turpentine oil induced arthritis .The bio chemical parameters were increased in all arthritic rats, there parameters were decreased by the administration of aqueous extraction of *Hibiscus platinifolius Linn* at dose of 200mg and 400mg respectively. From this study it has been concluded that the aqueous extract of leaves of *Hibiscus platinifolius Linn* having good anti–arthritic activity, which is comparable to Diclofenac sodium.

DISCUSSION AND CONCLUSION

The treatment of diseases in man using plants, plant extracts and pure compounds is increasing day by day. Medicinal plants and the active principles isolated from them are an
important discovery in human beings to fight against diseasesand disorders. Plants contain various phytochemicals likealkaloids, Terpenoids, Glycosides, Phenols, Tannins, andsaponnins which have an important role in the defensemechanism of the body.
The plant *Hibiscus Plantifolius*is being used by Traditionalhealers and tribal communities for various ailments. TheHepatoprotective, antioxidant and Toxicity studies haveshowed significant results and this may be due to the presenceof phytochemical compounds like triterpenes and flavanoids.As there are very limited researches have been carried out on
this plant, there is a need of extensive research on this plantfocusing on its pharmacological and biochemical aspects ofstudies.

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