HISTOPATHOLOGICAL RESULTS AND DISCUSSION

- Normal group’s liver showed normal architecture of liver structure.
- Patchy hemorrhagic necrosis of hepatocytes, sinusoidal dilation and necrosis seen around central vein and also around portal triad were observed in group treated with paracetamol.
- 1st treated group showed the presence of inflammation and lymphatic infiltration.
- IIIrd treated showed the low level of peripheral inflammation and lymphatic infiltration.
- IVth treated group showed the regenerative activity on liver cells.
- The liver section of the rats treated with Vth showed the presence of inflammation of lymphatic cells.

Higher doses 3g/body weight leads to necrosis in liver cell indicates its damaging effect on paracetamol group than treated groups. The 1st and Vth plant ethyl acetate extract treated group showed inflammation and lymphatic infiltration around portal triad compared to other extract treated groups indicate a non significant protection than other groups. IIInd and IIIrd treated groups gives better effect in histopathology than other groups. But no evidence of normal structure of liver in treated group is seen which indicates that long duration of treatment and higher dose of ethyl acetate extract is required for complete recovery.
SUMMARY AND CONCLUSION

Many plants and plant drugs were used for liver disorders to assessment of *in vivo* antioxidant activity. For the same purpose, five different flower’s ethyl acetate extracts were used for determination of *in vivo* antioxidant activity and hepatoprotective activity on paracetamol induced liver damage in male albino rats. In this study higher dose of 3g paracetamol is used for damage. From this observed results between normal, control and treated groups the following points were concluded.

- Lipidperoxidation, liver marker enzymes, bilirubin were increased in control than normal and treated groups.
- Antioxidant enzymes: SOD, CAT and antioxidant vitamins: E and C were decreased in control than normal and treated groups.
- Declained level of total protein and alubmin were observed in control than normal and treated groups.
- In histopathological studies, the control group’s liver architecture distributed and necrosis appeared than treated groups.
- Necrosis level was decreased in II, III and IV plants than others.
- In this comparitive study, it is concluded that the IV plant have higher antioxidant activity than others. Likewise, liver markers were decreased highly in IV group than others. Moreover effect on protein and α-FP level also decreased highly by III plant than other groups. From the overall result, it is concluded that IV plant extract have better effect on *in vivo* antioxidant / hepatoprotective effects in this study. It may due to the phytoconstituents kampferol-3-O-β-glucoside and astragalin.
ANTI INFLAMMATORY ACTIVITY

INTRODUCTION

Inflammation is part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants. The classical signs of acute inflammation are pain, heat, redness, swelling, and loss of function. Inflammation is a protective attempt by the organism to remove the injurious stimuli and to initiate the healing process.

Inflammation can be classified as either acute or chronic. Acute inflammation is the initial response of the body to harmful stimuli and is achieved by the increased movement of plasma and leukocytes (especially granulocytes) from the blood into the injured tissues. A cascade of biochemical events propagates and matures the inflammatory response, involving the local vascular system, the immune system and various cells within the injured tissue. Prolonged inflammation, known as chronic inflammation, leads to a progressive shift in the type of cells present at the site of inflammation and is characterized by simultaneous destruction and healing of the tissue from the inflammatory process.

Process of acute inflammation.

The process of acute inflammation is initiated by cells already present in all tissues, mainly resident macrophages, dendritic cells, histocytes, Kupffer cells and mastocytes. Cells present on their surfaces are certain receptors named pattern recognition receptors (PRRs), which recognize molecules that are broadly shared by pathogens but distinguishable from host molecules, collectively referred to as pathogen-associated molecular patterns (PAMPs). At the onset of an infection, burn, or other injuries, these cells undergo activation (one of their PRRs recognize a PAMP) and release inflammatory mediators responsible for the clinical signs of inflammation. Vasodilation and its resulting increased blood flow causes the redness (rubor) and increased heat (calor). Increased permeability of the blood vessels results in an exudation (leakage) of plasma proteins and fluid into the tissue (oedema), which manifests itself as swelling (tumor). Some of the released mediators such as bradykinin increase the sensitivity to

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pain (hyperalgesia, dolor). The mediator molecules also alter the blood vessels to permit the migration of leukocytes, mainly neutrophils, outside of the blood vessels (extravasation) into the tissue. The neutrophils migrate along a chemotactic gradient created by the local cells to reach the site of injury. The loss of function (functio laesa) is probably the result of a neurological reflex in response to pain.

In addition to cell-derived mediators, several acellular biochemical cascade systems consisting of preformed plasma proteins act in parallel to initiate and propagate the inflammatory response. These include the complement system activated by bacteria and the coagulation and fibrinolysis systems activated by necrosis, e.g. a burn or a trauma.

The acute inflammatory response requires constant stimulation to be sustained. Inflammatory mediators have short half lives and are quickly degraded in the tissue. Hence, acute inflammation ceases once the stimulus has been removed302.

Exudative component

The exudative component involves the movement of plasma fluid, containing important proteins such as fibrin and immunoglobulins (antibodies), into inflammed tissue. This movement is achieved via, the chemically induced dilation and increased permeability of blood vessels, which results in a net loss of blood plasma. The increased collection of fluid into the tissue causes it to swell. This extravasated fluid is funneled by lymphatics to the regional lymph nodes, flushing bacteria along to start the recognition and attack phase of the adaptive immune system.

Vascular changes

Acute inflammation is characterized by marked vascular changes, including vasodilation, increased permeability and increased blood flow, which are induced by the actions of various inflammatory mediators. Vasodilation occurs first at the arteriole level, progressing to the capillary level, and brings about a net increase in the amount of blood present, causing the redness and heat of inflammation. Increased permeability of the
vessels results in the movement of plasma into the tissues, with resultant stasis due to the increase in the concentration of the cells within blood, a condition characterized by enlarged vessels packed with cells. Stasis allows leukocytes to marginate (move) along the endothelium, a process critical to their recruitment into the tissues. Normal flowing blood prevents this, as the shearing force along the periphery of the vessels moves cells in the blood into the middle of the vessel.

**Plasma cascade systems**

- The complement system, when activated, creates a cascade of chemical reactions that promotes opsonization, chemotaxis, and agglutination, and produces the MAC.
- The kinin system generates proteins capable of sustaining vasodilation and other physical inflammatory effects.
- The coagulation system or *clotting cascade* which forms a protective protein mesh over sites of injury.
- The fibrinolysis system, which acts in opposition to the *coagulation system*, to counterbalance clotting and generate several other inflammatory mediators.
**Cellular component**

The cellular component involves leukocytes, which normally reside in blood and must move into the inflamed tissue via, extravasation to aid in inflammation. Some act as phagocytes, ingesting bacteria, viruses, and cellular debris. Others release enzymatic granules which damage pathogenic invaders. Leukocytes also release inflammatory mediators which develop and maintain the inflammatory response. Generally speaking, acute inflammation is mediated by granulocytes, while chronic inflammation is mediated by mononuclear cells such as monocytes and lymphocytes.

**Carageenan and Paw oedema.**

Inflammation is a local response of living mammalian tissues to the injury. It is a body defense reaction in order to eliminate or limit the spread of injurious agents. There are various components to an inflammatory reaction that can contribute to the associated symptoms and tissue injury. Oedema formation, leukocyte infiltration and granuloma formation represent such components of inflammation. Oedema formation in the paw is the result of a synergism between various inflammatory mediators that increase vascular permeability and/or the mediators that increase blood flow. Several experimental models of paw oedema have been described. Carrageenan-induced paw oedema is widely used for since long time without any adverse effects.

Carrageenan is a high molecular weight sulphated poly-saccharide that is used in pharmacology to induce local inflammation (paw oedema and pleurisy). It is a pro-inflammatory polysaccharide useful to assess the contribution of mediators involved in vascular changes associated with acute inflammation.

Carrageenan induced oedema has been commonly used as an experimental animal model for acute inflammation and is believed to be biphasic. The early phase (1–2 h) of the carrageenan model is mainly mediated by histamine, serotonin and increased synthesis of prostaglandins in the damaged tissue surroundings. The late phase is sustained by prostaglandin release and mediated by bradykinin, leukotrienes, polymorphonuclear cells and prostaglandins produced by tissue macrophages. Exploring
the healing power of plants is an ancient concept. For centuries people have been trying to alleviate and treat disdetermining the acute phase of inflamemation.

Drugs which are in use presently for the management of pain and inflammatory conditions are either narcotics e.g. opioids or non-narcotics, salicylates and corticosteroids, hydrocortisone. All of these drugs possess well known side and toxic effects. Moreover, synthetic drugs are very expensive to develop and whose cost of development ranges from 0.5 to 5 million dollars. On the contrary many medicines of plant origin had been used ease with different plant extracts and formulations. Therefore five plants flower ethyl acetate extracts of *Grevilla robusta*, *Jacaranda mimosifolia*, *Anacardium occidentale*, *Ipomoea aquatica* and *Tithonia diversifolia* were used for investigation of anti-inflammatory effect on carageenan induced paw oedema in albino rats.
REVIEW OF LITERATURE

Inflammation is basically a defense phenomenon but can lead to serious pathological conditions. It is treated by various agents with good to moderate success because of both considerable toxicity and side effects. There are various mediators to cause an inflammatory reaction that can contribute to the associated symptoms and tissue injury. Even though non steroidal anti-inflammatory drugs are the most commonly prescribed drugs in the world, their use as anti-inflammatory agents continues to be principally limited by their undesired side effects. Hence, the traditional medical practitioners and scientists are turning towards Indian System of Medicine (ISM).

Chandrashekar R., S. N. Rao study, dried powdered leaves of *Leucas indica* were subjected to solvent extraction by using 90 % ethanol. Based on acute oral toxicity study according to Organization for Economic Cooperation and Development (OECD) guidelines No. 423, three doses of the test drug 75, 150 & 300mg/kg were selected and subjected to preclinical anti-inflammatory screening by carrageenan induced paw oedema in Wistar Albino rats. Oral administration of Ethanolic Extract of Leaves of *Leucas Indica* (EELLI) at doses of 150 mg/kg and 300mg/kg showed significant anti-inflammatory activity 52.58% (p < 0.01) and 36.87% (p < 0.05) respectively compared to control.

Extracts of the flowering aerial parts of *Stachys schtscheg leevii* SoSn. and *S. balansae* Boiss. and *Kotschy* ex Boiss have been used in Iranian folk medicine as remedy for rheumatic and other inflammatory disorders and anti-inflammatory and analgesic effects of some species of *Stachys e.g. Stachys inflata* have been reported. In this study, the anti-inflammatory and anti nociceptive properties of total methanolic extracts of the flowering aerial parts of two *Stachys* species in rat were investigated by carrageenan induced paw oedema and formalin test. Intraperitoneal injection of the extracts, 60 min before induction of inflammation, resulted in inhibition of carrageenan induced rat paw oedema in dose dependant manner (doses 50, 100 and 200 mg/kg). In the formalin test, the extract (50, 100 and 200 mg/kg) had low effect in the first phase (0–5 min) of the formalin-induced pain, but all three doses showed analgesic and anti nociception effects significantly. This shamsali rezazadeh et al., study concluded that methanolic extracts
of *Stachys schtschegleevii* and *Stachys balansae* have analgesic and anti-inflammatory effects in formalin test and carrageenan induced paw oedema.

*Acrostichum aureum* (*A. aureum*) Linn. (Family: Pteridaceae) locally known as ‘Tiger fern’ is an evergreen shrub distributed widely throughout Bangladesh, India, USA, Brazil, China, Taiwan, Japan, Australia and Sri Lanka mostly on mangrove forests and sea coast area. The ethanolic extract of the plant contains 2-butanolone, ponasterone, pterosterone, kaempferol and quercetin. Traditionally, the roots are used to treat rheumatism, wounds and boils. Leaves are used to stop bleeding. The plant contains glycosides, saponins, steroids and fronds are used as pain-killers and stomach troubles.

The ethanolic crude extract of the root of *Acrostichum aureum* was evaluated for its anti-inflammatory activity. In Hemayet Hossain et al study, at the dose of 400 mg/kg body weight, the extract showed a significant anti-inflammatory activity in the carrageenan induced oedema test in rats showing 65.90% reduction in the paw volume (P < 0.01) comparable to that produced by the standard drug indomethacin (66.66%) after 24 h. The obtained result tends to suggest the probable anti-inflammatory activity of the ethanolic crude extract of the root of *Acrostichum aureum* and justify its use in folkloric remedies.

The Sokeng et al study was carried out to evaluate the anti-inflammatory and anti-pyretic properties of the aqueous leaf extract of *H. rostellatus*. Carrageenan-induced hind paw oedema in rats, xylene-induced ear oedema in mice and cotton pellet-induced granuloma formation in rats were used to investigate anti-inflammatory activity, and brewer’s yeast-induced pyrexia in mice was used to determine anti-pyretic effect. Oral administration of the plant extract (50 and 100 mg / kg) exhibited a significant (p < 0.05) inhibition of paw oedema induced by carrageenan with a maximum inhibition of 62.68% recorded with the dose 100 mg/kg compared to the control. In the xylene-induced oedema test, the extract at the same doses, also exhibited an anti-inflammatory activity. It was also demonstrate that *H. rostellatus* extract at similar doses reduced granulomatous tissue formation in cotton pellet induced granuloma test. These results indicate that the aqueous leaf extract of *H. rostellatus* possess anti-inflammatory and antipyretic properties and may support its folk use for the treatment of inflammatory disorders.
Capraria biflora L. (Scrophulariaceae) is a perennial shrub, distributed in North and South America and it is extensively used as a medicinal plant for a wide variety of ailments. It has been used to treat fever and for their diuretic, stimulant and digestive properties and is also regarded as a tonic and beneficial to digestion. Several investigations demonstrated that in the roots there is a compound known as bifluorin with antibiotic activity. The anti inflammatory effects of leaves of Capraria biflora L. were investigated\(^{310}\). The Sulay Loy et al study, aqueous extract 10\% was administered at different doses in two models of inflammation: the carrageenin-induced paw oedema in rats and the peritonitis induced by carrageenin in mouse. In two tests, the dose of 200 mg / kg–1 of the extract showed anti-inflammatory activity like indomethacin and the effect was dose dependent. It is possible that the anti inflammatory effect of this plant may obey to more than one mechanism and that the flavonoids could be involved in it.

Hibiscus sabdariffa is used for medicinal purposes, especially in alternative medicine. It is a folk remedy for abscesses, cancer, cough, debility, dyspepsia, dysuria, fever, hangover, heart ailments, neurosis, scurvy and strangury\(^{311}\). The Dafallah, AA. and Al-Mustafa study was carried out to investigate the anti-inflammatory activity of methanolic extract of H. sabdariffa in adult wistar rat. The study showed that low dose (250 mg/kg b.w) treatment with the methanolic extract of H. sabdariffa had no effect on the carrageenan induced inflammation after two hours of treatment. There was a decrease in paw diameter in high dose (500 mg/kg b.w) of methanolic extract of H. sabdariffa treated group which is also in agreement with the findings\(^{312}\). H. sabdariffa is known to have ascorbic acid as one of its phytochemicals which has been proposed to have an anti-inflammatory activity\(^{313}\). Apart from this phytochemical, it also consists of flavonoids such as hibiscitrin and hibiscetin and polyphenols\(^{314}\) and other minerals.

The effects of Filicium decipiens (Family: Sapindaceae) leaf extracts on different models of acute inflammation were studied by Paramaguru et al. Investigations were performed using different phlogistic agents-induced paw oedema viz., Carrageenan-induced paw oedema and dextran-induced paw oedema in rats. Various extracts (ethanol and aqueous) of F. decipiens leaves at a dose of 250 mg/kg and 500 mg/kg orally were tested. Diclofenac sodium at the dose of 10mg/kg was used as st.
showed significant activity (*p < 0.05 & **p < 0.01) compared with the control in carrageenan- induced rat paw oedema model and where as ethanolic extract (500 mg) showed a significant reduction (68.42%) in dextran - induced rat paw oedema model. Thus it is revealed from the screening model that the ethanol and aqueous extract of this plant possesses acute anti-inflammatory activity.

The anti-inflammatory activity of the aqueous extract of *Chromolaena odorata* was investigated in rats using the carrageenan-induced oedema, cotton pellet granuloma and formalin induced oedema methods. The extract was administered orally at doses of 25, 50, 100 and 200 mg/kg. In the carrageenan method the paw oedema was significantly reduced by all the doses of the extract administered, with the 200 mg/kg dose producing the highest oedema inhibition (80.5%). In the cotton pellet method, granuloma weight was significantly reduced from 14±0.1 to 9.0± 0.1 mg, while in the formaldehyde induced arthritis the extract inhibited the oedema during the 10-day period. Victor et al study has established the anti-inflammatory activity of *C. odorata* and thus, justifies the traditional uses of the plant in the treatment of wounds and inflammation.

The Phag, *Rivea ornata* (Family- Solanaceae) is one of unique Rivea species widely spread in tropical and subtropical countries. *R. ornata* seed oil was found to contain 12, 13-epoxy-octadec-cis-9-enoic acid (vernolic acid, 22.0%) along with the other normal fatty acids like palmitic acid (24.2%), stearic acid (8.9%), oleic acid (17.1%) and linoleic acid (27.8%) 6-9. Juice of the plant is used topically in hemorrhagic diseases and piles. In Sharma study was aimed at providing pharmacologic basis for its folkloric use in inflammation and other species of Rivea were found to have anti- inflammatory activity. Based on this Sharma attempt has been made to evaluate the inflammation potency of *R. ornata*. This investigation concluded that the methanolic extract of aerial parts of plant *R. ornata* showed anti-inflammatory effects, similar to those observed for non-steroidal drug such as Indomethacin. It is important to point out that the phytochemical analysis showed the presence of flavonoids and this might be responsible for anti-inflammatory activity. The observed effect may be due to inhibition of phlogistic mediators, antagonizing their interaction with their respective receptors or it may be due to general mechanism like increasing the membrane stability in the cell.
The effects of *Cordia dichotoma forst* f. seeds extracts on different phases of acute inflammation were examined. Investigations were performed using different phlogistic agents-induced paw oedema viz., Carrageenan-induced paw oedema and Dextran- induced paw oedema in rats. Various extracts (ethanol and aqueous) of *C. dichotoma forst* seeds at a dose of 250 mg/kg and 500 mg/kg orally were tested. Diclofenac sodium at the dose of 10mg/kg was used as standard. Both the extracts showed significant activity (*p*<0.05 & **p*<0.01) compared with the control in both of these models. The dry powdered seeds were found to contain alkaloids, glycosides, saponins, tannins and carbohydrates. Thus it is revealed from the screening model used that the ethanol extract and aqueous fraction of this plant possesses acute anti inflammatory activity.
Scope of the study

Modern drugs cause various side effects for human beings because of this reason modern world is now turned to plant based medicine for various diseases. Based on this view, this work is designed for elucidation of the effect of five different flower’s ethyl acetate extract on acute model of carrageenan induced paw oedema in rats.

For this study, rat paw volume was measured and statistically analyzed.
MATERIALS AND METHODS

ANIMALS:

Male albino rats weighing about 120-180 g are housed in poly propylene cages and maintained in controlled temperature with 12 hs period of lightdark and fed with standard rat fed and water.

CHEMICALS:

Carrageenan 1%, TBA, 2,4,DNPH reduced glutathione used are analytical grade.

EXPERIMENTAL DESIGN:

Acute inflammation is provided by injection of 0.1ml of 1% carrageenan into the sub plantar surface of rat hind paw.

Group I : Served as control.

Group II : Rats were received 0.1 ml of 1% carrageenan.

Group II(a) : Rats were received 25mg/kg of diclofenac sodium orally in the volume of 0.5 ml/kg before carrageenan induction.

Group III : Rats were received 1.0 ml of ethyl acetate extract of *Grivellae robusta* (200 mg/kg/i.p) and 0.1ml of carrageenan.

Group IV : Rats were received 1.0 ml of ethyl acetate extract of *Jacaranda mimosifolia* (200mg/kg/i.p) and 0.1 ml of carrageenan.

Group V : Rats were received 1.0 ml of ethyl acetate extract of *Anacardium occidentale* (200mg/kg/i.p) and 0.1 ml of carrageenan.

Group VI: Rats were received 1.0 ml of ethyl acetate extract of *Ipomoea aquatica* (200mg/kg/i.p) and 0.1 ml of carrageenan.

Group VII : Rats were received 1.0 ml of ethyl acetate extract of *Tithonia diversifolia* (200mg/kg/i.p) and 0.1 ml of carrageenan.
INSTRUMENTATION:

The paw volume is measured on the basis of mercury from the apparatus. This apparatus is made up of borosil glass jar with side tube which is filled with mercury up to the mark of side tube. After the injection of 1% carrageenan in the planter surface of the hind paw, swelling is appeared. Then it is immersed in mercury jar, which displace the particular volume of mercury, it is proportional to paw volume.

The formula used to measure the percentage of oedema

\[
\text{Percentage of oedema} = \frac{V_t - V_0}{V_0}
\]

Where,

V0 is before treatment

Vt is volume of each group after treatment

\[
\text{Percentage of inhibition} = \frac{\text{control-treated}}{\text{control}} \times 100
\]

STATISTICAL ANALYSIS:

The statistical analysis of the evaluation of the anti-inflammatory activity of the five flowers in ethyl acetate extract against the carrageenan induced paw oedema in albino rats were analyzed using Turky’s method (ANOVA) and expressed as mean ± SEM. Differences between the mean of treated animals and control groups were considered significant at \( P < 0.0001 \).
Effects of plants on carageenan induced inflammation

Group – A  Normal
Group -B  Paracetamol treated

Ethyl acetate concentrates of species
Group-C  Plant – I (*Grevillea robusta*) treated Group-
D  Plant– II (*Jacaranda mimosiflia*) treated
Group-E  Plant – III (*Anacardium occidentale*) treated
Group-F  Plant – IV (*Ipomoea aquatica*) treated
Group-G  Plant – V (*Tithonia diversifolia*) treated
TABLE VIII-1
EFFECTS OF PLANTS ON CARAGEENAN INDUCED INFLAMMATION

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>CONTROL</th>
<th>STD DRUG</th>
<th>Ethyl acetate concentrates of species</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>% INHIBITION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 HOUR</td>
<td>28.29</td>
<td>10.48±63.23</td>
<td>15.13±0.15</td>
</tr>
<tr>
<td>II HOUR</td>
<td>30.08</td>
<td>9.27±71.47</td>
<td>14.59±0.41</td>
</tr>
<tr>
<td>III HOUR</td>
<td>35.06</td>
<td>8.42±75.98</td>
<td>13.35±0.27</td>
</tr>
<tr>
<td>V HOUR</td>
<td>29.25</td>
<td>7.96±76.06</td>
<td>12.14±0.09</td>
</tr>
</tbody>
</table>

STD Drug: Diclofenac sodium
GRAPH VIII-1

EFFECTS OF PLANTS ON CARAGEENAN INDUCED INFLAMMATION

![Bar Chart]

- Group-I
- Group-II
- Group-III
- Group-IV
- Group-V
- Group-VI
- Group-VII

Percentage of inhibition

1ST hour  |  2nd hour  |  3rd hour  |  5th hour
RESULT AND DISCUSSION

Inflammation is a heamostatic phenomenon which is likely to be backbone of pathology\textsuperscript{318}. It is one of the fundamental response of cells and tissues to injuries caused by various toxious and infectious agent. When inflammation is left to itself, it displays a short course of reaction\textsuperscript{319}. In this study 0.1 ml carageenan was given to induce acute inflammation in hind paw of rats.

The flavonoid glycoside, chrysoeriol 7-O-β-D glucopyranosyl (2→1) –D-apiofuranoside isolated from Dalbergia volubilis exhibited AIA\textsuperscript{320}. Quercetin, quercetin 3-O-rhaminoside (quercitrin) and extracts of leaves of \textit{M.morindoides} showed similar inhibition of classical pathway of complement system\textsuperscript{321}. Similarly in the present study the oedema were decreased by all the plants used in histamic (I h) phase, bradykinine (III h) and serotonin(5 h) phases like that of standard drug used (diclofenac sodium). But the percentage inhibition of oedema was lower than standard drug,though the plant ethyl acetate extracts inhibit the oedema volume.

From this study it was confirmed that in histamin phase II, III and IV plants offered better effect in oedema inhibition than others. In that way, in bradykinine phase the oedema volume was decreased highly by II and III plants than others. Likewise in serotonin phase II and III plant had better activity in inhibition of oedema than others.
SUMMARY AND CONCLUSION

Inflammatory disorders are largely distributed disorder in India. Though it have various medicines, it is moving towards new natural drug discovery for treatment. Based on this view the ethyl acetate extract of the five different flowers are taken for anti inflammatory activity. This study have shown that the ethyl extract of the five flowers possessed a significant anti-oedematogenic effect on paw oedema induced by carrageenan. Since carrageenan-induced inflammation model was a significant predictive test for anti-inflammatory agents acting by the mediators of acute inflammation. The results of this study are an indication that the ethyl acetate extract can be effective in acute inflammatory disorders. Oedema volume is measured in three different phases; histamine, bradykinine and serotonin. From this results the study concluded that the plant II and III have better effect on oedema volume and it have good anti inflammatory activity than other extracts. It may be due to the flavonoid constituents in the ethyl acetate extracts of the plants.
SUMMARY AND CONCLUSION

INTRODUCTION

A general introduction to flavonoids and a survey of their various pharmacological properties are presented. A survey of distribution of flavonoids belonging to the families Proteaceae, Bignoniaceae, Anacardiaceae, Convolvulaceae and Asteraceae.

CHAPTER 1

This chapter deals with the studies on the flavonoid constituents of five plants belonging to the above mentioned families.

The present investigation deals with the isolation and characterization of Kaempferol – 5-O-β – glucoside, from the fresh yellow flowers of Grevillea robusta.

The fresh flowers of Jacaranda mimosifolia have been found to contain Isoquercitrin, Quercitlin – 3 – 0 – glucoside the structure of which has been established by physical and chemical means.

Quercetin has been isolated from the flowers of Anacardium Occidentale and appropriately characterized with modern physical methods.

The fresh flowers of Ipomoea aquatica on suitable extraction and fractionation have afforded Kaempferol and astragalin, and the structure of which has been established by means of UV, NMR chromatographic techniques.
*Tithonia diversifolia* has been taken up for investigating its polyphenolic constituents in its flowers. The flowers of this plant on extraction and fractionation, have resulted in the isolation of Quercetin and Quercimeritrin, the structural elucidation of which was based on physical and chemical methods.

**CHAPTER - II**

This chapter deals with the *invitro* anti-oxidant activity of the flavonoid glycosides isolated from the plants mentioned in chapter I. The effect of isolated flavonoids has been evaluated using DPPH. From the results, all the five compounds are found effective as antioxidant propofol.

**CHAPTER III**

Chapter three deals with hepatotoxic effect and *in vivo* by paracetamol induction. Liver markers and biochemical parameters were studied for different isolated flavonoids because of its immense role. Fruitful results were observed through the analysis.

**CHAPTER IV**

An *in-vivo* investigation of the anti-inflammatory activity of the flavonoids has been described in this chapter. Carrageenan – induced rat paw oedema method has been adopted for the purpose. The activity of the flavonoid isolates were comparable to that of the standard drug diclofenac sodium.