Delonix elata is used in the treatment of various diseases by local folks. Since, these plants possess many medicinal properties; the present study was designed to evaluate the phytochemicals and the antimicrobial activity of leaf extract of Delonix elata. The invitro antimicrobial activity was performed by agar disc diffusion method against bacterial viz. Staphylococcus aureus, Bacillus subtilus, Klebsiella, E.coli, Proteus sp. and Pseudomonas sp. and fungi viz. Aspergillus Niger, Pencillium sp., Candida albicans. The organic extracts especially alcoholic extract, showed maximum against the micro organism. The presence of broad range of phytochemicals in Delonix elata can certainly serve as an effective natural herbal source against inflammatory diseases.

Screenings of plant extract (Delonix elata) and plant products for antimicrobial activity have shown that higher plants represent potential sources of new-anti-infective agents. The organic extraction of plants (especially alcoholic extract) greater activity than aqueous extracts. Hence the study suggests that the organic solvent especially alcoholic solvent is suitable to screen for the antibacterial activity. The result of present study reveals that the extract of plant exhibited potential antibacterial activity against the tested pathogens. The study also supports the view that several medicinal plants might be useful as antimicrobial agent. In the present study the notable activity was observed against all tested micro organisms. This shows that the plant can be used for medicinal purposes.

Medicinal plants (Cassia auriculata, Catharanthus roseus, Delonix elata, Hibiscus sabdariffa, Mukia maderasptna, Ruellia tuberosa, Vitex negundo) were analyzed for their phytochemical analysis and antioxidant activity. Methanolic extracts of these plants (leaves) showed high antioxidant activity and Delonix elata possessed the highest percent inhibition of DPPH scavenging, reducing power and hydroxyl radical scavenging activity amongst all studied plants and also hold substantial amount of phenols and flavonoids which may be responsible for their antioxidant activity.
Swiss albino mice were used and divided into 5 groups and treated accordingly: Normal control, collagen induced group (50ug/kgbw), collagen+ Astaxanthin (6mg/kgbw), collagen+Delonix elata (60mg/kg bw), and standard drug treated (15mg/kgbw). After the experimental period of 7 days, blood and tissue samples were collected and serum was separated by centrifuging at 3000 rpm for 10 minutes and subjected for the determination of Paw thickness, Serum (Lysosomal) enzymes like Alanine transaminase (ALT) (IFCC, 1986), Aspartate transaminase (AST) (Brodie, 1968) and Alkaline phosphatase (ALP) (IFCC, 1986), lipid peroxidation (Niehaus and Samuelsson, 1968), haematological parameters like total leucocytes count, Total Red Blood Corpuscles (RBC), Total White Blood Corpuscles (WBC), Haemoglobin (Lehmann 2002). Tissue Hexosamine, Tissue Hydroxy proline, biochemical parameter like Serum protein (Lowry et al., 1951).

Administration of collagen in mice resulted in a significant increase in the levels of serum enzymes, LPO, total leucocytes, hydroxy proline, hexosamine and also in the length of the paw thickness while, the increase in the levels of above parameters were inhibited by pretreatment of Delonix elata leaf extract. Collagen to the experimental animals produced reduction in the levels of total protein, total RBC and Hb. The animals pretreated with Delonix elata leaf extract at dose level of 60 mg/kgbw was significantly enhanced the levels of total RBC and Hb.

The acute study experimental findings of hematological and biochemical parameters suggest that Delonix elata possesses effective bioactive compounds like Astaxanthin that may responsible for its anti-inflammatory activity.

The present chronic study concludes that Delonix elata (60 mg/bw) pretreatment signifies its preventive and protective effect against inflammation. Inflammatory markers like pro inflammatory (IL-1β, TNF-α, IL-6) and anti-inflammatory cytokines (IL-4, IL-10) are the important parameters in assessing inflammation. The marked elevated levels in the pro and anti inflammatory cytokines (markers) were noted in the collagen induced animals. The remarkable reduction in the levels of pro and anti-inflammatory cytokines (markers) was observed in the Delonix elata (methanolic leaves extract) pretreated animals shows its preventive action against inflammation. The results arrived by the chronic study upholds the
positive effect of *Delonix elata* to act as a potential anti-inflammatory agent against inflammation Rheumatoid arthritis.

The effectiveness of lead compounds identified and characterized from the methanolic leaf extract of *Delonix elata* further confirms especially by molecular docking study which comprehensively emphasis the docking efficiency of *Delonix elata* lead compounds exhibited the binding efficiency specifically Astaxanthin posed highest docking score (ACE) ranging from **-343.24** and **-112.58** for various targets which are for better than other compounds docked. The molecular docking study result provides an insight into the pharmacological potential indulged in *Delonix elata*.

Medicinal plants are part and parcel of human life to combat diseases form the dawn of human civilization. Plants used in traditional medicine contain a wide range of phytocompounds that can be used to treat chronic infectious diseases. Thus, the green leaves of *Delonix elata* possess many nutracetuical effect and phytochemical effect which will be certainly useful in treating and preventing Rheumatoid arthritis. Especially the bioactive compounds like Astaxanthin may be responsible for the therapeutic effect of this plant that produce definite physiological function in the system. It would be beneficial for the humans to explore the traditional green varieties can be included into their daily menu and can able to lead healthy life in a natural way.

**Future Recommendations**

1. Development of drug designing can be elucidated for the lead compounds.

2. More clinical and pre-clinical trials are recommended for the lead compounds in order to establish its anti-inflammatory and antioxidant effect to combat serious and slowly emerging diseases.