CONCLUSION

CONCLUSION:

- In the present investigation rhizomes of *A. galanga* (L.) Willd, *A. officinarum* Hance and *A. purpurata* (Vieillard) K. Schumann were selected for evaluation pharmacognostical, pharmacological, bioanalytical and analytical properties.
- Detailed macroscopic and microscopic evaluations were done on the selected important medicinal plants.
- Extractions were carried out by different solvent system and the most pharamacological active extract was selected for isolation of active molecule. The extracts were labeled as AEAG for acetone extract of *A. galanga* and MEAO for methanolic extract of *A. officinarum*.
- Phytochemical analysis of all the extracts revealed for presence of alkaloids, flavonoids, tannins and phenolic compounds.
- Acute oral toxicity studies performed according to OECD guideline-425 revealed that all the extracts were safe up to a dose of 2000 mg/kg of body weight.
- Anti-inflammatory activity of all the extracts were investigated using carrageenan induced paw edema and cotton pellet granuloma model in rats.
- In carrageenan induced paw edema model, pretreatment with AEAG and MEAO for 7 days before carrageenan injection showed significant inhibition of increase in paw edema and the results were comparable to that of the standard diclofenac.
- In cotton pellet induced granuloma model, treatment of AEAG and MEAO for 7 days showed significant inhibition of granuloma formation and the results were comparable to that of diclofenac.
- Histopathology of stomach was also performed to assess ulcerogenic property of all the extracts and standard diclofenac. Diclofenac showed ulceration and congestion in stomach. In comparison to that all the extracts showed lesser ulceration and congestion.
- Results of anti-inflammatory activity suggested that, AEAG and MEAO had anti-inflammatory potential in both carrageenan-induced paw edema as well as cotton pellet granuloma, so it was assumed that it is effective in the later phase by reducing the release of prostaglandins, proteases and lysosome.

- AEAG and MEAO showed superior anti-inflammatory activity so both were selected for further determination of its antiarthritic potential in FCA induced arthritis model.
- Antiarthritic activity of AEAG and MEAO were investigated using FCA induced arthritis in rats.
- Antiarthritic activity of AEAG and MEAO were assessed by various parameters such as, body weight, paw volume, joint diameter, tectile allodynia and thermal hyperalgesia. On the last day, haematological, biochemical, antioxidant parameters and histology of ankle joint were also assessed.
- AEAG and MEAO were showed significant antiarthritic potential in FCA induced arthritis in rats, comparable to that of the standard diclofenac.
- Isolations were carried out on AEAG and MEAO for searching active molecule responsible for arthritic activity.
- Fractionations of both extracts were evaluated for anti-inflammatory activity using carrageenan induced paw edema.
- Results of anti-inflammatory activity suggested that, fraction (B2) from AEAG and fraction P3 (III) from MEAO had anti-inflammatory potential in carrageenan-induced paw edema, so it was assumed that it is effective in the later phase by reducing the release of prostaglandins, proteases and lysosome.
- Characterization of fraction (B2) from AEAG was done by using NMR, IR. The isolated compound of fraction (B2) from AEAG was 1'-Acetoxychavicol acetate (ACA).
- Characterization of fraction P3 (III) from MEAO was done by using NMR, IR. The isolated compound of fraction P3 (III) from MEAO was galangin.
- Antiarthritic activity of AEAG and ACA were investigated using FCA induced arthritis in rats.
- Antiarthritic activity of AEAG and ACA were assessed by various parameters such as, body weight, paw volume, joint diameter, tectile allodynia and thermal hyperalgesia. On the last day, haematological, biochemical, antioxidant parameters and histology of ankle joint were also assessed.

- AEAG and ACA were showed significant antiarthritic potential in FCA induced arthritis in rats, comparable to that of the standard diclofenac.
- In case of body weight, AEAG and ACA treated group showed non-significant improvement as compared to arthritic group.
- In case of paw volume and joint diameter, AEAG and ACA at 400 and 20 mg/kg treated group showed significant inhibition of increase in paw volume and joint diameter as compared to arthritic group.
- In case of tectile allodynia and thermal hyperalgesia, AEAG and ACA at 400 and 20 mg/kg treated group showed significant increase in paw withdrawal latency as compared to arthritic group.
- In case of biochemical parameters, AEAG and ACA at 400 and 20 mg/kg treated group showed significant decrease in AST, ALT and ALP level, whereas TP level was non-significantly increased as compared to arthritic group.
- In case of haematological parameters, AEAG and ACA at 400 and 20 mg/kg treated group showed significant decrease in WBC, platelet and CRP level as compared to arthritic group. AEAG and ACA at 400 and 20 mg/kg treated group showed significant increase in Hb and RBC level as compared to arthritic group.
- In case of antioxidant parameters, AEAG and ACA at 400 and 20 mg/kg treated group showed significant increase in SOD and GSH level as compared to arthritic group. AEAG and ACA at 400 and 20 mg/kg mg/kg treated group showed significant decrease in MDA level as compared to arthritic group.
- In histopathological studies, arthritic group showed severe synovitis, influx of inflammatory cells, pannus formation and cartilage destruction. Treatment with AEAG and ACA at 400 and 20 mg/kg showed partial protection such as mild pannus formation and cartilage destruction.
- Antiarthritic activity of MEAO and galangin were investigated using FCA induced arthritis in rats.
- Antiarthritic activity of MEAO and galangin were assessed by various parameters such as, body weight, paw volume, joint diameter, tectile allodynia and thermal hyperalgesia. On the last day, haematological, biochemical, antioxidant parameters and histology of ankle joint were also assessed.

- MEAO and galangin were showed significant antiarthritic potential in FCA induced arthritis in rats, comparable to that of the standard diclofenac.
- In case of body weight, MEAO and galangin treated group showed non-significant improvement as compared to arthritic group.
- In case of paw volume and joint diameter, MEAO and galangin at 400 and 20 mg/kg treated group showed significant inhibition of increase in paw volume and joint diameter as compared to arthritic group.
- In case of tectile allodynia and thermal hyperalgesia, MEAO and galangin at 400 and 20 mg/kg treated group showed significant increase in paw withdrawal latency as compared to arthritic group.
- In case of biochemical parameters, MEAO and galangin at 400 and 20 mg/kg treated group showed significant decrease in AST, ALT and ALP level, whereas TP level was non-significantly increased as compared to arthritic group.
- In case of haematological parameters, MEAO and galangin at 400 and 20 mg/kg treated group showed significant decrease in WBC, platelet and CRP level as compared to arthritic group. MEAO and galangin at 400 and 20 mg/kg treated group showed significant increase in Hb and RBC level as compared to arthritic group.
- In case of antioxidant parameters, MEAO and galangin at 400 and 20 mg/kg treated group showed significant increase in SOD and GSH level as compared to arthritic group. MEAO and galangin at 400 and 20 mg/kg mg/kg treated group showed significant decrease in MDA level as compared to arthritic group.
- In histopathological studies, arthritic group showed severe synovitis, influx of inflammatory cells, pannus formation and cartilage destruction. Treatment with MEAO and galangin at 400 and 20 mg/kg showed partial protection such as mild pannus formation and cartilage destruction.
- Based upon these pharmacological data, we concluded that the acetone extract of *A. galanga* (L.) Willd, methanolic extract of *A. officinarum* Hance, isolated ACA and galangin possess significant anti-inflammatory and antiarthritic activity activities in animal models.

- It is thus concluded that, acetone extract of *A. galanga* (L.) Willd, methanolic extract of *A. officinarum* Hance, isolated ACA and galangin possessed anti-inflammatory and antiarthritic activity. The probable mechanism of action appears to be due to inhibition of the later phase of carrageenan induced paw edema model by restraining the release of kinin-like substances and prostaglandins productions.
- Present study showed competitive response of *in vitro* grown callus when compared to naturally grown plant material of *A. purpurata*.
- The work was started with the initiation of callus from different explants of *A. purpurata* on growth medium supplemented with various combinations of growth hormones.
- The best result for callus initiation of *A. purpurata* was found in MS media with a combination of 2, 4-D (2 ppm) +kinetin (2ppm).
- The best result for roots initiation of *A. purpurata* was found in MS media with a combination of IAA 3ppm.
- Optimization of biomass production and enhanced accumulation of active compounds by different biotechnological strategies like elicitation and precursor feeding of this important medicinal plant will be matter of further research.
- The present study describes HPTLC method for the qualitative and quantitative estimation of rutin and quercetin (phenolic compound)
- Both the methods were found to be simple, precise, specific, reproducible, sensitive and accurate and can be used for the quantitation of rutin and quercetin (phenolic compound) in the plant materials, tissue culture extracts, routine quality control of raw materials and formulations containing rutin and quercetin.
- The results of HPTLC methods revealed that rutin and quercetin (phenolic compound) content was more in tissue culture grown material than naturally grown plants.