Inflammation is part of the complex biological response of vascular tissues towards various harmful stimuli, such as harmful pathogens, damaged cells, or irritants. Inflammation may be of two forms depending upon severity and duration i.e. acute or chronic. Its cardinal signs are redness (rubor), heat (calor), swelling (tumor), and pain (dolor), often accompanied by loss of function of organs. Sustained acute inflammation results into the development of various chronic diseases like arthritis, systemic erythematosus lupus, crohn’s disease etc. Arthritis, an auto immune disease, affects nearly 1% of the world’s total population. It is a prevalent condition which often leads to high burden of suffering in patients. Arthritis is a systemic chronic inflammatory disease which mainly affects the joints of the body leading to joint erosions and cartilage erosions. Till date various pharmacological treatments are available for treating arthritis such as Non- Steroidal Anti-inflammatory Drugs (NSAIDs), Disease Modifying Anti-rheumatic Drugs (DMARDs), corticosteroids and biological agents like TNF-α antagonists, IL-1R antagonists. But, these drugs are mostly associated with various harmful adverse effects like gastro–intestinal ulcers, liver failure, predisposition towards development of osteoporosis, development of various infections inside the body due to weak defence system of the body, development of melanomas, effect on reproductive potential of females etc. Therefore, due to the associated side effects of these medicines people are shifting towards the use of complementary and alternative medications (CAMs). CAMs mainly involve the use of natural plant products by exploiting the knowledge of ayurveda or by investigating the folklore medicines used as anti-inflammatory and anti- arthritic agent. Out of many natural products being widely used in treatment of arthritis in folklore medicines, one of the commonly used plant is C. asiaticum. C. asiaticum (species: Amaryllidaceae, order: Asparagales, var. sinicum), commonly known as the white spider lily, is a bulbous perennial herb easily available as the ornamental plant in major parts of India. The plant is evergreen, herbaceous and fast growing. The origin of the plant is Indian and Western Pacific Ocean coastlines. It grows well in sandy soil. The plant has already found wide use in beauty products and
has also been reported to show anti-inflammatory effect in case of bradykinin-induced uterus contractions. Other than this report there are no detailed scientific study reported on this plant for its anti-inflammatory activity. The plant leaves are widely used in folklore medicines for the treatment of arthritis in certain parts of north India and Vietnam. Keeping this in mind the present thesis work focuses on studying the anti-inflammatory and anti-arthritic effect of the methanolic extract of plant *Crinum asiaticum*.

To start with, the leaves of *Crinum asiaticum* was collected from the Northern part of India, mainly from Allahabad in Uttar Pradesh. The leaves were cut into small pieces and shade dried and 50% methanol extract was prepared which was further concentrated to dryness using rota vapour to vaporize methanol and lyophilized into powdered form. The dried plant extract was dissolved in 30% DMSO and used for further studies.

In the first chapter of thesis experiments were conducted for evaluating the anti-inflammatory activity of the methanolic extract of the plant *C.asiaticum*. In order to check the anti-inflammatory activity various rat models showing different types of inflammation were used. Xylene induced ear inflammation model showing topical inflammation, dextran and histamine induced hind paw inflammation in rats resembling the acute inflammatory conditions produced by exogenous as well as endogenous inflammatory mediators were also used. In case of xylene - induced ear oedema, xylene was applied topically on the posterior surface of rat ear and extract was applied topically on the anterior surface of the ear. The extract showed an inhibition in the development of ear oedema suggesting the use of the extract to be effective in case of topical inflammation. In the histamine and dextran induced paw oedema, the extract exhibited significant anti-inflammatory activity at the tested doses of 200mg/kg b.w. and 400 mg/kg b.w. The effect was more pronounced at the higher dose of 400 mg/ kg b.w. Further, the extract was checked for its synergistic effect with the conventional drugs like acetyl salicylic acid (ASA) commonly used in case of any acute inflammation. It was observed that the plant extract did not show any augmentation in the anti-inflammatory response shown by ASA in case of dextran - induced inflammation or histamine-induced inflammation. Once the extract exhibited
significant anti-inflammatory effect, it was necessary to find out whether the extract showed any ulcerogenic effect as it is often observed as one of the major side effects of many commonly used anti-inflammatory medicines. The extract did not show any ulcerogenic effect in the animals even at the higher dose of 400mg/kg b.w. Further, the anti-pyrogenic activity and membrane stabilization activity, the two important parameters of acute inflammation were also studied. *C.asiaticum* extract showed a potent anti-pyretic effect. The extract also had showed a stabilizing effect on membrane at a higher dose. Thus, from all the above experiments it was clear that the plant extract of *C.asiaticum* exhibited potent anti-inflammatory activity without showing any ulcerogenic effect.

Next, the effect of *C.asiaticum* on chronic inflammation was determined. For which a rat model was developed. The second chapter of the thesis deals with the development of arthritis model in the Wistar rat. The model was developed in rat by giving the single injection of 100µl of complete Freunds’ adjuvant (CFA) in the sub plantar region of the right hind paw. The disease development and progression was assessed monitoring the change in the body weight, hind paw volume, recording the arthritic score and radiological examination of bones. There was a gradual a) decrease in the body weight, b) increase in the hind paw volume and c) increase in the arthritis score in the CFA-induced rat as compared to the control rat with the progression of arthritis thus showing the development of disease. Further, radiological examination of the hind paw and tail bone joints showed a typical fusion of joints in the disease model as compared to the control animals. Further, phagocytic activity of the macrophages isolated from the peritoneum and hind paw of the control and diseased rats were assessed as these cells are found to play a major role in development of arthritis and its progression. The macrophages isolated from the peritoneum and hind paw of arthritis induced animals exhibited increased phagocytic activity as compared to the macrophages obtained from control animals. This suggested the presence of activated macrophages in the peritoneum and hind paw of CFA induced rats further corroborating the development of arthritis model. Thus, this model could be further used to evaluate the anti-arthritic activity of the plant *C.asiaticum*. 
The third part of the thesis deals with the evaluation of the anti-arthritic property of the methanolic extract of the plant *C. asiaticum*. Before assessing the anti-arthritic effect, the LD50 of the plant extract was tested up to 1000 mg/kg b.w. The animal did not show any mortality up to 72 hours with the plant extract. Therefore, two doses of 200 mg/kg b.w. and 400 mg/kg b.w. was used for the experiment. In order to check the anti-arthritic effect, intra-peritoneal injection of the extract was given to the animal from day 0 till day 10 in the animals which were induced with CFA. During the experiment, it was observed from the hind paw volume of rats that the plant inhibited the development of disease. There was marked inhibition in the hind paw swelling with the extract treatment. It was seen that the rats which received the pre-treatment of plant extract before the induction of disease with CFA showed an initial decrease in the body weight but with the course of time they regained their body weight. On comparing arthritis score, it was also observed that the animals which received the intra-peritoneal injections of the plant extract showed a lower value of score as compared to the group of untreated CFA induced arthritis rats. Further, on radiological examination also it was observed that the animals which received the treatment of plant extract showed relatively very less or no fusion of joints both in the hind paw bones as well as the tail bones. It was also observed that the extract treated group of rats showed less opacity in the bones which further indicated the prevention of disease development. As mentioned earlier that macrophages play a pivotal role in development of arthritis, and also shown in chapter 2 of this thesis that the macrophages get activated in arthritis rats. Next, the effect of plant extract was checked on activated macrophage functions. For this RAW 264.7 cells were activated with LPS, mimicking inflammation and were further used to study the effect of *C. asiaticum* on phagocytosis and NO release. Effect of *C. asiaticum* was compared with dichlofenac, which is a conventionally used as anti-arthritic drug. The results indicated that the plant extract inhibited LPS induced phagocytosis and NO release by the activated macrophages in a time dependent manner. Hence, from the above experiments, it can be deduced that the methanolic extract of the plant *C. asiaticum* showed potent anti-arthritic effect suggesting it to be a potential remedy for treating arthritis.
Once the plant was seen to possess anti-inflammatory and anti-arthritic activities, the extract was further tested to determine the major components. The fourth chapter of the thesis deals with the characterization of the major compounds present in the extract and which may be responsible for the observed anti-inflammatory and anti-arthritic effect. In order to characterize the major components, GC-MS of the plant extract was performed and 10 major peaks were obtained which was matched with the Wiley 08 library as well as the NIST 15 library in order to know the most probable compound. Following ten major compounds were isolated: butyric acid( 3, 7-dimethyl -6- octenyl ester); 4- Hepten- 3- one, 4 methyl; Palmitate (hexa decanoic acid); Phthalic acid [1,2,- Benzene dicarboxylic acid, bis (2-methylpropyl) ester ]; 1,5- anhydro-6-deoxyhexo-2,3-diulose; Tridecan-1-ol; isoamyl nitrite; methyl 12-methyl tetradecanoate; 2, 2’, 5, 5’- tetra hydro and 2-pentynon-2-enal.

From the above work it can be concluded that the methanolic extract of the plant C.asiaticum leaves possess a potent anti-inflammatory and anti-arthritic activity. The 10 components isolated through GC-MS should be further assessed to find out which of these components are responsible for the observed anti-inflammatory and anti-arthritic activity.