

SUMMARY

The authenticated rhizomes of *C. zedoaria* and the leaf of *T. involucrata* were selected for the study. Extractions were carried out using soxhlet and qualitative phytochemical screening for the extracts was performed. The extracts of rhizomes of *C. zedoaria* were screened for the presence of various phytoconstituents and it was found that the ethyl acetate extract to contain phenols and terpenoids and the chloroform extract showed the presence of only terpenoids. A novel 6-ethoxy-3a-methoxyazulen-1(3aH)-one molecule was isolated from the chloroform extract of rhizomes of *C. zedoaria*. The GC-MS analysis results identified the presence 2-Propenoic acid, 3-phenyl-, ethyl ester (**16**), 2,6,11-trimethyldodecane (**17**), Ethyl p-methoxy cinnamate (**18**) which was confirmed through NIST library database. The results of the antimicrobial and anti-diabetic study showed the extracts of the rhizomes of *C. zedoaria* possessed potent antimicrobial activity and moderate α -amylase enzyme inhibitory activity.

The *in vitro* anti-urolithiasis study of the extracts of rhizomes of *C. zedoaria* revealed the ethyl acetate extract of the rhizome to contain potent urolithiasis inhibitory activity of all the extracts. *In vivo* anti-urolithiasis activity reports showed the ethyl acetate extract of rhizome of *C. zedoaria* to exhibit better urolithiasis inhibitory activity comparable to standard drug. Terpenoids and phenol content of the ethyl acetate extract might be responsible for the potent urolithiasis inhibitory activity and nephroprotective effect of rhizomes of *C. zedoaria*. Since the rhizomes of *C. zedoaria* are well known for their medicinal use orally as well as topically, the rhizomes can be used for the treatment of urolithiasis without any toxicity concerns.

A detailed study on the phytochemical contents of *Tragia involucrata* leaf extracts was performed. Qualitative and quantitative screening of the extracts revealed the presence of phenols and flavonoids in ethyl acetate extract and terpenoids in petroleum ether extract. Six biomolecules were identified with the aid of GC-MS results using NIST library. Docking studies of the six biomolecules against COX-1 and COX-2 target receptor indicated 19 β , 28-epoxyleanan-3-ol and squalene molecule to exhibit potent anti-inflammatory property from its high docking scores.

The leaf extracts of *T. involucrata* were screened for its various pharmacological activities including antioxidant, anti-inflammatory, anti-diabetic and anti-arthritis

activities. The ethyl acetate extract of *T. involucrata* showed potent antioxidant activity and the petroleum ether extract exhibited potent anti-inflammatory and anti-arthritis properties respectively. The anti-diabetic assay results suggested that the aqueous extracts of *T. involucrata* containing carbohydrates to exhibit better anti-diabetic property compared to the other extracts. A good correlation was obtained between the phenol, flavonoid content and antioxidant activity. Similarly, a positive correlation was obtained between the terpenoid content and anti-inflammatory activity. From the docking results and correlation studies, it could be concluded that antioxidant activity was attributed to the presence of phenols and flavonoids whereas terpenoids present in *T. involucrata* leaf extract play a vital role in its anti-inflammatory activity.

A simple eco-friendly method of synthesis of AgNPs using *T. involucrata* leaf extract was carried out. The phytoconstituents present in the extract acted both as a reducing and stabilizing agents for the formation of stable AgNPs. The capping of AgNPs was confirmed through FTIR analysis. The crystalline nature and average particle size (47nm) of the AgNPs was confirmed through the XRD and TEM analysis. The aqueous extract of *T. involucrata* and its nanoparticles displayed potent inhibitory effect on the growth of struvite crystals in gel medium. The treatment with aqueous extract of *T. involucrata* prevented crystal nucleation and also dissolved the crystals formed in the gel medium and this inhibitory activity was found to be enhanced in case of its AgNPs treated groups. The inhibitory activity was more pronounced in the prophylactic group of AgNPs as compared to the group receiving prophylactic treatment with aqueous extract of *T. involucrata*. The urolithiasis inhibitory effect might have been due to the rich content of bioactive phenol, flavonoid and terpenoid contents present in *T. involucrata*.

The above studies conclude that the rhizomes of *C. zedoaria*, leaves of *T. involucrata* and AgNPs obtained leaf extract of *T. involucrata* can be employed as an alternative medicine for the prophylactic treatment of urolithiatic condition. Further, the isolation of the individual phytoconstituents and study on their mechanism of inhibition might provide a better safe and efficient lead molecule in future for the treatment of the various disorders discussed.