ABSTRACT

Urolithiasis or kidney stones are very common and highly recurring renal disorder. This disease has been very painful and had been detected from middle age onwards. The treatment has started in the form of open surgery which has been given path to the new inventions of treatments like Extracorporeal Shock Wave Lithotripsy (ESWL) to Laser Lithotripsy where the laser technique is the latest development. The disadvantages of the laser lithotripsy treatment had been studied clinically in surgically removed urinary stones by using Ho: YAG lithotripter. It has been proven that the efficiency of treatment drastically decreases for bigger stones and the cost of the treatment is high which is not feasible for all the societies.

The disadvantages of the laser lithotripsy had been overcome by proposing a new treatment modality for urolithiasis called dielectric therapy. The urinary crystals had been developed in vitro using gel growth technique. The characterizations like XRD and FTIR has been done to confirm the crystal composition and nature. The dielectric properties has been studied in this crystal and proved that the urinary crystals possess a dielectric property and thereby proposed a new fragmenting technique. The working model of the new treatment technique has been proposed and since the source used is of less cost, the cost of treatment will reduce drastically and is feasible.

The alternative medicine has been gaining prominence for almost every disease, these days. Since all the conventional treatment for urolithiasis is painful, the intake of oral medicine will help the patients a lot. The in vitro
study on the effect of a tropical herb, *Scoparia Dulcis*, has been studied in struvite crystals. The analysis proved that the drug has significant effect in reducing the growth of urinary crystals. Thereafter, the effect of the drug has been studied *in vivo* in calcium oxalate induced male Wistar rats. The urine, serum and histopathological analysis has been done in the rats to prove that the drug significantly inhibits or dissolved the urinary crystals with very less effect on other organs like liver, urinary bladder and renal systems.

The treatment will be effective, only if the diagnosis of a disease is done with more accuracy and in less time. The prevailing diagnostic techniques are either imaging which includes X-Ray, CT Scan, Ultrasound etc or biochemical analysis like 24 hour urine analysis; where both the techniques have its own limitations and accuracy issues. They cannot be used in mobile health centers or rural health care systems, where sophisticated lab environment or technicians are absent. This has been overcome by developing a portable sensing gadget to screen uricemia patients with the help of gold modified carbon paste electrodes sensing system. The gold nanoparticles has been prepared and mixed with graphite to produce working electrode, Ag/AgCl as reference electrode and Platinum as counter electrode. The sensitivity and selectivity of the electrode system has been checked using known concentration of uric acid solutions, artificial urine which showed a very significant positive response. The entire gadget has been prepared using this sensing system along with embedded circuit and display. The gadget response has been checked for real samples with the standard clinical kit results and made a correlation plot which gave a high correlation value $\alpha = 0.05$. 