

Nephroprotective activity of Ethanolic Extract of *Orthosiphon stamineus* Leaves on Ethylene Glycol induced Urolithiasis in Albino Rats

K. Ramesh, S Manohar and S. Rajeshkumar*

Department of Biochemistry, Adhiparasakthi College of Arts and Science
Kalavai – 632506, Vellore District, TN, India.

*Corres.author: j3ssrajesh@gmail.com, srajeshkumar@sify.com

Abstract: *Orthosiphon stamineus* is the one of the important medicinal plant which used for kidney based problems traditionally. In the present investigation the ethanolic extracts of *O. stamineus* leaves have been used for the nephroprotective activity. The ethylene glycol used to inducing the urolithiasis in albino rats. The rats are divided into four groups namely I (Normal), II (Ethylene glycol induced), III (commercial drug treated) and IV (*O.stamineus* extract treated). The final results shows the ethonolic extracts of plants have good nephroprotective activity when compared with the standard drug. It was proved by analyzing the biomarkers and enzymes level. The results show the good nephroprotective herbal commonly used in tea and easily available medicinal plants for all peoples. .

Key words: Nephroprotective activity, *Orthosiphon stamineus*, ethanolic extracts, medical.

Introduction

The problems related with kidney are the major problem for humanbeings throughout the world because kidney is the major excretory organ in animals and humans. The major functions of kidney is balancing of electrolytes and regulation of water, production of erythrocytes by stimulating the function of erythropoiesis, regulation the acid base balance, regulation of blood calcium level, and it involves the process of gluco neogenesis. There is many of the diseases are affecting the kidney like Acute renal failure and chronic renal failure, chronic renal failure, uremia, anemia in chronic renal failure, bartter's syndrome, fanconi's syndrome, hypertension and the kidney, urethritis, polycystic disease, renal hypophosphatemia, renal glycosuria, nepherogetic diabetes insipidus, renal caluli and kidney stones.

Using of herbal plant extracts for the nephroprotective activity is the best method in the traditional medicine. Because when we use the chemical compounds may induce the side effects for the many organs of our body. But plants are having lot of phytochemicals which heal the kidney damages without and side effects.

Orthosiphon stamineus is a medicinal one of the important medicinal plant in Asian countries coming under the family of lamiaceae. the leaves of this plants is famous for the Java tea in European countries and south east Asia [1]. There is a lot of biochemicals present in the plant extracts have been play an important role

in medicinal applications. Some biochemicals obtained from *O. stamineus* proteins, flavonoids, poly phenolic compounds, higher amount of potassium, sugars and volatile oil. In recent years some bioactive compounds like ursolic acid, β -sitosterol, oleanolic acid, lipophilic flavones, caffeic acid derivatives like rosmarinic acid, 2,3-dicaffeoyltartaric acid and betulinic acid.[2, 3].

The biomedical application of *O. stamineus* is very bulky one because it plays an very good role in various health problems. Some good roles of *O. stamineus* are reducing fever [4], antioxidant antimicrobial activity against *Vibrio parahaemolyticus* and *Streptococcus mutans* [5,6], Antioxidant activity [5,7], good hepatoprotective agent [8].

In this present investigation study of Anti-Nephroprotective activity of ethanolic extract of *Orthosiphon stamineus* leaves is carried out by inducing the kidney stone in albino rats using ethylene glycol. The serum parameters like Creatinine, Uric Acid, Urea, total protein and the serum marker enzymes SGOT, SGPT and ALP were analysed before and after the treatment of *Orthosiphon stamineus*. Then the treatment of standard drug Cystone was compared with our plant extracts.

Materials and Methods

Animals:

All experiments were carried out in a highly inbred male Wister Albino rat's. The rats weighed 160g were used. The animals were housed in specious caged under hygienic conditions (13th light 12th dark cycle at room temperature) and maintained on commercial pellet diet containing protein-21%, lipid-5% nitrogen free extract-55% and provided with metabolically energy at 3600 cal/kg and also enriched by vitamins and minerals supplied by Hindustan Lever Limited" Mumbai. Ethical clearance was obtained from the Institutional Animal Ethical Committee, CPCSEA, India (Reg No.282/ac/09/CPCSEA).

Preparation of plant material:

Leaves of *O. stamineus* were collected from Vellore, South India. The leaves were extracted by hydro distillation method.

Experimental design:

Male albino Wistar rats (180-200 gm) were obtained Animal House of Adhiparasakthi College of Arts and Science, Kalavai. Acclimatized animals were divided into four groups of six each. Group I. normal condition, Group II ethylene glycol induced, Group III. *O. stamineus* leaves Ethanolic extract orally for 10 days, Group IV: standard drug cystone orally for 10 days.

Serum collection:

Blood was collected from jugular vein. Serum was separated from the blood using centrifugation techniques. From the collected blood biochemical analysis was carried out, in that the parameters like Blood Urea, Uric Acid, Creatinine, ALP, SGOT, SGPT, Total Protein was analysed by standard procedures.

Result and Discussion

There is a lot of phytochemicals are present in the leaves of *O. Stamineus* rich in flavanoid, phenol, and terpenoids are having good role in the medicinal values of the plant[9]. This property have an effort is more to study the biomedical applications like antioxidant character, antilithiatic property, anti-inflammatory personality of the constituents present in the leaves extract. Most phytochemical have antioxidant activity and protect our body against lithiatic damage and reduce the risk of developing certain disorder.

After the treatment by *Orthosiphon stamineus* which normalize the above mentioned parameter in the rats.

Figure 1 depict that the level of urea in serum. The different bio-chemical parameter registered a significant raise in serum of ethylene glycol treated Group-II rats as compacted to the normal control Group-I and *Orthosiphon stamineus* treated Group-III rats and cystone treated Group IV rats. Urea is one of the degradative products of protein metabolism mainly excreted through the urine. On ethylene glycol treated group, cause damage to renal tubule suppress the excretion of urea in the renal tubule. May leads to elevated level of urea in serum.

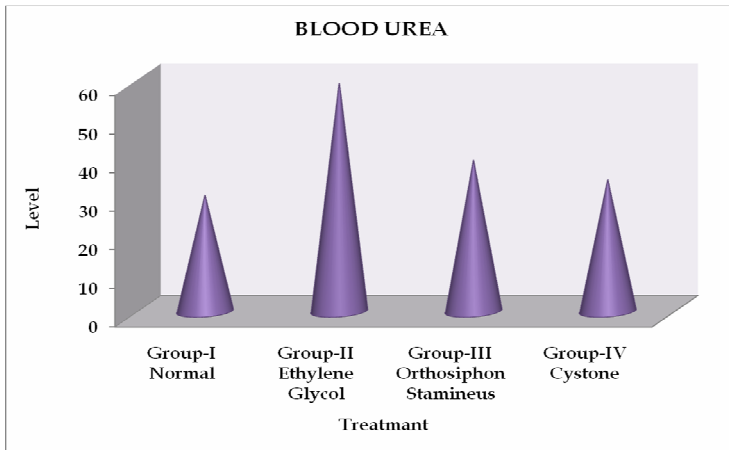


Figure 1: Graphical analysis of blood urea in different group of rats

Figure 2 depict that the level of uric acid in serum. The different bio-chemical parameter registered a significant raise in serum of ethylene glycol treated Group-II rats as compacted to the normal control Group-I and *Orthosiphon stamineus* treated Group-III rats and cystone treated Group IV rats. Uric acid is the degradative product of nucleic acid. The increased amount of uric acid associate with renal calculi.

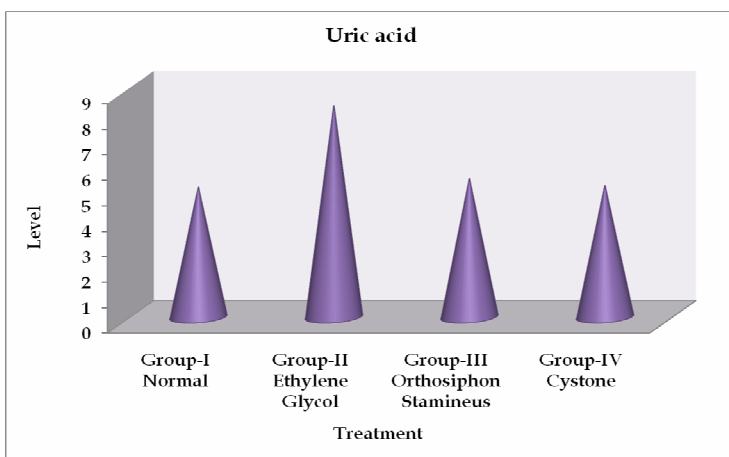


Figure 2: Graphical analysis of uric acid in different group of rats

Figure 3 depict that the level of creatinine in serum. The different bio-chemical parameter registered a significant raise in serum of ethylene glycol treated Group-II rats as compacted to the normal control Group-I and *Orthosiphon stamineus* treated Group-III rats and cystone treated Group IV rats. Oral administration of Ethylene glycol increases the serum creatinine level may be due to accumulation of salts and fluid. It reduces the effectiveness of diuretic drugs and may leads to increased or raised level of creatinine in urine.

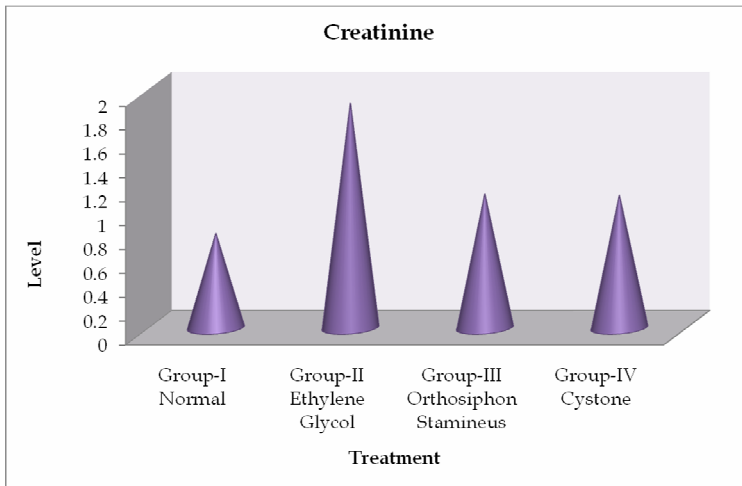


Figure 3: Graphical analysis of creatinine in different group of rats

Tables 4, 5 & 6 and Figures 4, 5 & 6 depict that the level of marker enzymes (ALP, SGOT & SGPT) in serum. The different bio-chemical parameter registered a significant raise in serum of ethylene glycol treated Group-II rats as compacted to the normal control Group-I and *Orthosiphon stamineus* treated Group-III rats and cystone treated Group IV rats. The elevated level of ALP, SGOT & SGPT in the Group-II may due the damage caused by Ethylene glycol but on treatment along with *Orthosiphon stamineus* which projecting in renal damage by its anti-Urolithiatic properties and the level is normalized.

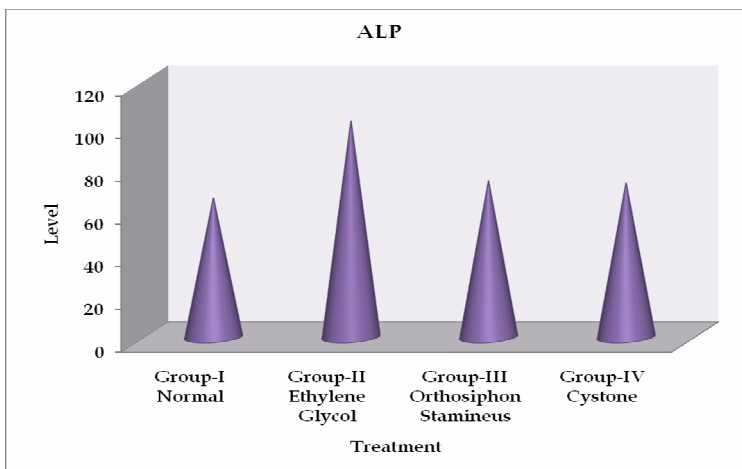


Figure 4: Graphical analysis of ALP in different group of rats

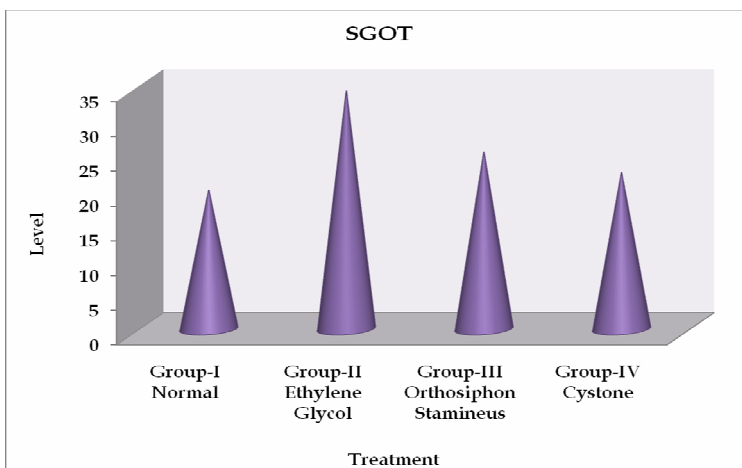


Figure 5: Graphical analysis of SGOT in different group of rats

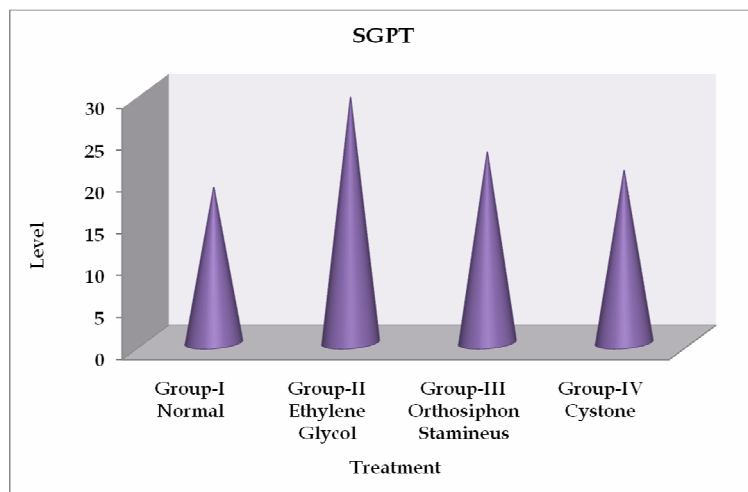


Figure 6: Graphical analysis of SGPT in different group of rats

Figure 7 represent that the level of Total protein in serum. The different bio-chemical parameter registered a significant raise in serum of ethylene glycol treated Group-II rats as compacted to the normal control Group-I and *Orthosiphon stamineus* treated Group-III rats and cystone treated Group IV rats. The raise in the ethylene glycol treated group in the serum is probably due to an inhibitory action of protein synthesis on induction of tissue damage and may leads to increased excretion of protein in urine. This may cause severe and virtually complete necrosis of the proximal tubules throughout cortex & some extension in the outer strip of the medulla.

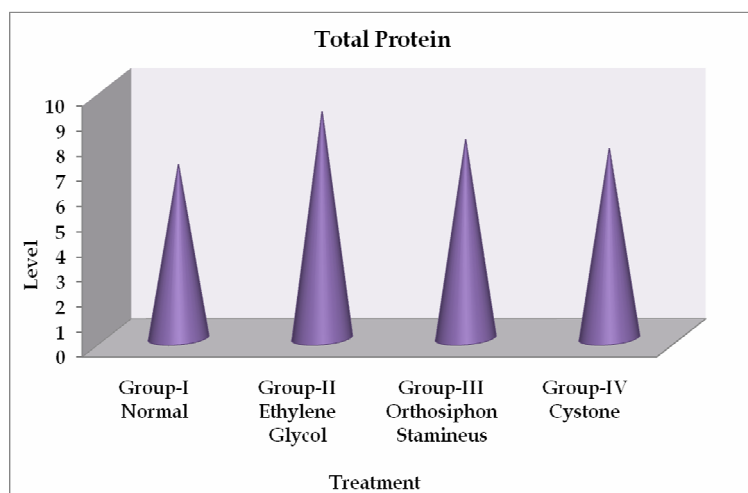


Figure 7: Graphical analysis of total protein in different group of rats

Conclusion

The world health organization estimate that approximately one third of the worldwide community is infected with kidney problems. Each year, nearly 5.5 millions new cases of infectious kidney stone happen in throughout the world. The current study was focused on the herbal medicine of *Orthosiphon stamineus* leaves ethanolic extract on the ethylene glycol induced kidney stones in rats. It was found to be effective decrease in the abnormal level of biomarkers which involves the kidney defect. This will be only a direct study and requires a large sample size to detect the adequate power that applies combined molecular and conventional epidemiologic techniques to investigate the mechanisms and risk factors for kidney stone formation in rural area of high prevalence in south India. In future, the *O. stamineus* based compounds will be used for the improved medicine in kidney based problems.

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