ISSN: 2231 3788 (Print)
Journal of PharmaSciTech
2012; 2(1):16-19
Research Article

Evaluation of Nephroprotective Activity of the Methanolic Extract of Leaves of *Bauhinia variegata* Linn, (Family-Caesalpiniaceae)

Prusty KB*, Harish B, Mamatha CH

Department of Pharmacology, Talla Padmavathi College of Pharmacy, Kareemabad, Warangal, India
***Address for correspondence:** Baikunthaprusty@gmail.com; Tel.: +91 9052799426*

Abstract

Bauhinia variegata in Telugu it is known as "Deva Kanchanam" and in hindi "Kanchanar" whose meaning "A glowing beautiful lady". Its various parts like flower, leaf, bark, stem, seeds, roots etc are practiced in various indigenous systems of medicine in India. After searching through the literatures and folk lore report the authors felt to carry on the nephroprotective activity of methanolic extract of leaves of *Bauhinia variegata* Linn. This nephroprotective study carried out by gentamicin induced nephrotoxicity. The result shown that the extract have very good protective effect in the control of creatinine, urea and uric acid. ($p < 0.001$)

***Keywords*:** *Bauhinia variegata*, methanolic extract, gentamicin induced nephrotoxicity, nephroprotective activity

Introduction

Now-a-days significant basic and clinical research has been carried out on the medicinal plants and their formulations, with the state of the art methods in a number of institutions or universities.[1] Indian medicinal plants also provide a rich source for antioxidants that are known to prevent or delay different diseased states.[2] The medicinal plants also contain other beneficial compounds or ingredients which can be used as food.[3] Hence the global knowledge about ayurveda and Indian herbals will hopefully be enhanced by information of the evidence-base of the plants.[4]

Bauhinia genus distributed throughout the tropical regions of the world. Due to large number of claims on the wide region of folk curative properties of Bauhinia variegata, considerable efforts have been made by the researchers to justify its efficacy as a curative agent through pharmacological investigations; the aim of the present research is to highlight the phytochemical and pharmacological investigations of this medicinal plant.

Materials and Methods

Plant material and extracts

For the present investigations the leaves of *Bauhinia variegata* was collected in and around Warangal, Andhra pradesh, in the month of October and November. The leaves were carefully shade dried for 25 days to ensure complete dryness. Leaves were kept in hot air oven at 45^{0}C for 5 min. Then the leaves were subjected to size reduction to make powder by using mechanical grinder. The crushed mass of leaves then carried out for the process of the extraction. The extraction is carried out using soxhlet apparatus. Powder weighing 60 g was extracted with 600ml of methanol for 22 h for each batch. The extracts were concentrated by vacuum distillation to reduce the volume upto attaining a semisolid mass. The stored in refrigerator in a air tight container.

Phytochemical study[5-7]

Qualitative screening of various extracts of leaves of *B.variegata* was performed for the identification of various classes of active chemical constituents by using different methods.[8]

Animals

Wistar albino rats (150-200g) of both sexes and mice (25-30g) of both sexes were procured from animal house at TPCP, Warangal and kept for 10 days to acclimatize to laboratory conditions before performance of the experiments. All the animals were fed with standard diet and water ad libitum. Before the commencement of the experiment (12h), the animals were deprived of food but not water.

Acute toxicity study[9]

The leaf extract has been subjected to toxicity study as per the guidelines set by OECD. The study was approved by Institutional Animal Ethics Committee (IAEC) no mortality and no signs of toxicity found after administration of dose at 2000mg/kg to female mice's. Hence 200mg and 400mg of this extract selected for further study.

Nephroprotective activity

Human beings are exposed intentionally and unintentionally to a variety of adverse chemicals which can harm the kidneys. As drugs, natural products, industrial chemicals, environment pollutants that cause nephrotoxicity has been increased. These nephrotoxicants can produce a variety of clinical syndromes such as acute renal failure, chronic renal failure, nephritic syndrome, hypertension and renal failure etc.

In the laboratory, we induced nephrotoxicity by administering gentamicin to rats

Method[12-13]

Swiss albino rats (150-200 g) of either sex were used for the study. Animals were divided into 3 groups, each containing 6 animals.

Treatment protocol

Group I : It is served as normal group and 5ml of distilled water is administered daily for 8 days.

Group II : It is served as control group and gentamicin (100mg/kg/day) is given daily for 8 days through intraperitoneal route.

Group III : It is served as test group and is given with MEBV (400mg/kg p.o.) daily for 8days concomitantly these rats are administered with gentamicin (100mg/kg/day) through intraperitoneal route.

After dosing on the day 8, individual rats were placed in separate metabolic cages for 24h for urine collection to determine urine creatinine, urea and uric acid content. Blood samples were collected via retro-orbital puncture at the end of 24h, the serum was rapidly separated and processed for determination of serum creatinine, serum urea, blood urea nitrogen (BUN), using. Body weight of animal was also recorded.

Table 1: Phytoconstituents in methanolic extract of leaves of the plant

S. No.	Tests	Methanolic extract
1	Tannins	+
2	Glycosides-cardiac	+
3	Flavonoids	+
4	Sugars	+
5	Alkaloids	-
6	Steriods	-

(+) Presence of phytoconstituent
(-) Absence of phytoconstituent

Table 2: Nephroprotective effect of methanolic extract of leaves of the plant on serum parameters

Group	Serum creatinine (mg/dl)	Serum uric acid (mg/dl)	BUN (mg/dl)
Group	0.70±0.02	0.30±0.03	24.40±0.97
Group II	1.25±0.05**	0.40±0.02*	76.11±0.92***
Group IIII	0.86±0.02*	0.36±0.02*	28.03±0.2**

*Values are expressed as MEAN±SEM, One way ANOVA followed by Dunnets't' test, Note: n=6 in each group (*P value <0.05, **P value <0.01, ***P value <0.001). MEBV: Methanolic extract of leaves of Bauhinia variegata L.*

Table 3: Nephroprotective effect of methanolic extract of leaves of the plant on Urine parameters

Group	Body weight (% Change)	Creatinine	Urea	Uric acid
Group	2.77±0.54	69±0.86	17.73±0.1	3.91±0.14
Group II	-9.03±1.54	194.5±1.77	32.67±0.73	18.76±0.17
Group IIII	-3.24±0.23**	137.67±2.08*	19.12±0.18**	8.28±0.15**

*Values are expressed as MEAN±SEM, One way ANOVA followed by Dunnets't' test, Note: n=6 in each group (*P value <0.05, **P value <0.01,). MEBV: Methanolic extract of leaves of Bauhinia variegata L.*

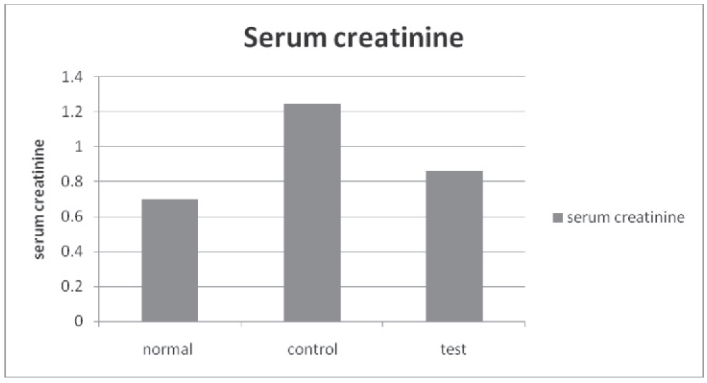

Fig. 1: Nephroprotective effect of methanolic extract of leaves of the plant on serum creatinine (X-axis: Different parameters that have been estimated in serum of rats; Y-axis: Concentration of the parameters in mg/dl)

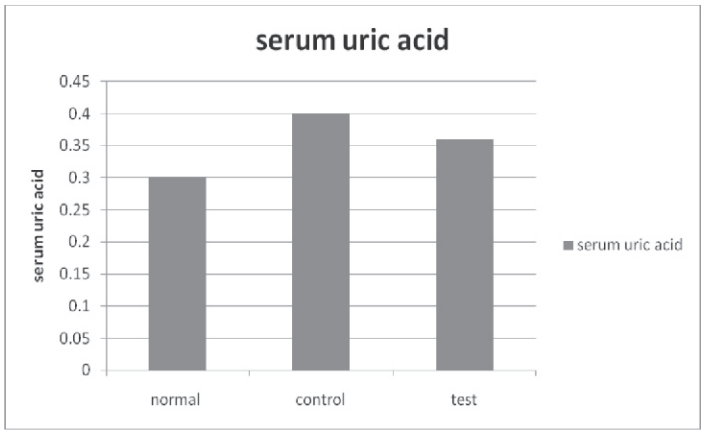

Fig. 2: Nephroprotective effect of methanolic extract of leaves of the plant on serum uric acid (X-axis: Different parameters measured in urine of rats; Y-axis: Mean concentrations of the parameters in mg/dl)

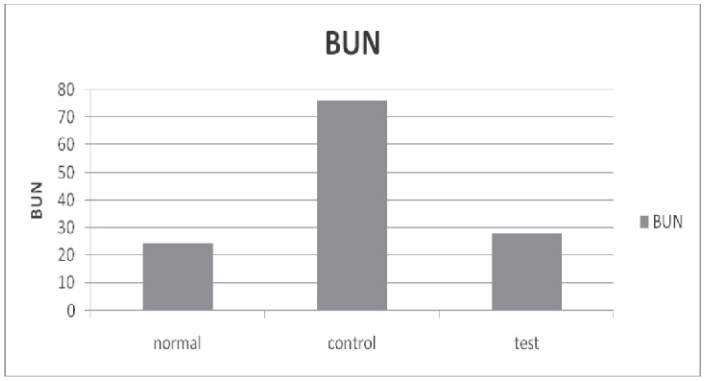

Fig. 3: Nephroprotective effect of methanolic extract of leaves of the plant on blood urea nitrogen (X-axis: Different groups of rats; Y-axis: Mean concentrations of BUN mg/dl)

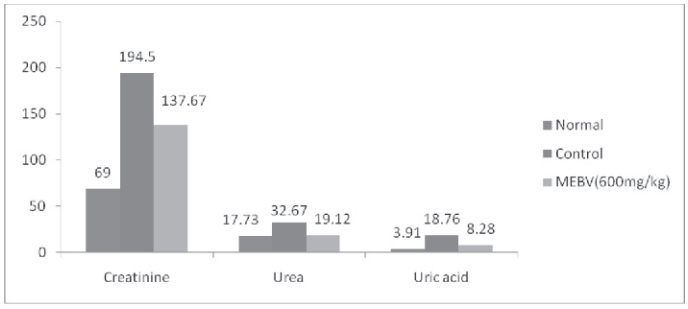

Fig. 4 : Nephroprotective effect of methanolic extract of leaves of the plant on urine parameters (X-axis: Different parameters measured in urine of rats; Y-axis: Mean concentrations of the parameters in mg/dl)

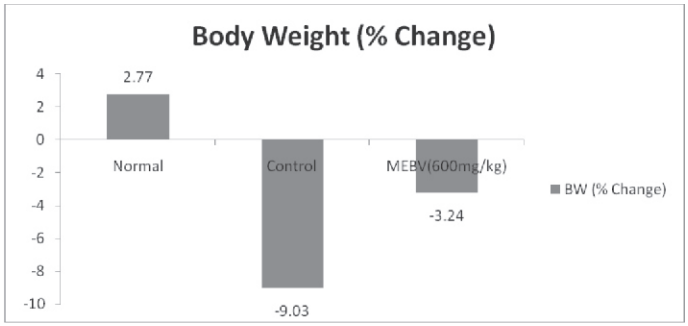

Fig. 5 : Percent change in body weights of rats (X-axis: Different groups of rats; Y-axis: Mean % change in body weights of the rats)

Results and Discussion

Nephrotoxicity has been induced by administering gentamicin (100mg/kg) daily for 8 days. This has been reduced by giving methanolic extract of the plant *Bauhinia variegata* (400mg/kg) daily for 8 days. Nephrotoxicity is identified by estimating the bio markers like serum creatinine, Blood Urea Nitrogen (BUN) and uric acid. Urine parameters are also estimated to know the extent of nephrotoxicity. It is occurred due to the necrosis of nephrons. GFR is also reduced in the patients who are suffering with nephrotoxicity. *Bauhinia variegata* shows significant effect on the nephroprotection due to its antioxidant effect. This antioxidant effect may be due to the presence of tannins and saponins that are present in the plant.

Methanolic leaf extract of the plant has significant nephroprotective activity. This has been observed by estimating the bio markers and listed in the above table. Methanolic leaf extract has reduced the increased creatinine levels when compared to the control group. Normal serum creatinine levels are 0.7 ± 0.02, that of the gentamicin treated group is 1.25 ± 0.05, that of plant treated group is 0.86 ± 0.02, Levels of BUN are

24.4±0.97, 76.11±0.92, 28.03±0.2 respectively. The levels in urinary parameters of all the groups are also altered by the leaf extract. Urinary parameters, creatinine of normal, control and methanolic leaf extract group are 69±0.86, 194.5±1.77, 137.67±2.08 and urea are 17.73±0.1, 32.67±0.73, 19.12±0.18 respectively. Decrease in the body weight of rats is also observed and that is significantly less when Methanolic group is compared with the control group.

Conclusion

Nephrotoxicity is the major adverse effect of different drugs. So it is a drug induced disease. This toxicity has been induced because of the release of the oxidants in kidney. Thus damaging or destructing the nephrons which are the basic functional units of kidney. The present study throws light on the effect of the plant Bauhinia variegata in reducing the nephrotoxic effect that has been induced by gentamicin which is a broad spectrum antibiotic used to treat many ailments. This study gives the idea that when we use the plant along with the gentamicin like antibiotics will reduce the incidence of nephrotoxicity. Further detailed scientific investigation of the plant will be helpful in treatment of drug induced toxicity.

References

1. The wealth of India, A dictionary of Indian raw materials and industrial products. Vol 2, CSIR New Delhi, 1959, pp. 56-57.

2. Maheshwari JK. Flora of Delhi-council of scientific and industrial research, 3rd edition, pp. 137.

3. Ravindra S. Medicinal plants of India an encyclopedia, 2nd edition, 2003, pp. 32-33.

4. Kirtikar R, Basu BD. Indian medicinal plants, Vol 1, 1999, pp. 892-901.

5. Pandey AK et al. Phytochemical evaluation and radical scavenging activity of Bauhinia variegata, Saraca asoka and terminalia arjuna barks. Research Journal of Phytochemistry 2011; 5(2): 89-97.

6. Golwala DK, Patel LD. Pharmacognostical studies of Bauhinia variegata Linn. Root. Journal of Young Pharmacists 2009; 1(1): 36-41.

7. Rajesh G, Padmaa MP, Usha G. Pharmacognostic and phytochemical screening of Bauhinia variegata Linn. Leaves. Journal of pharmacy Research 2009; 2(7): 1196-1198.

8. Khandelwal KR, Practical Pharmacognosy-Techniques and Experiments. Nirali Prakashan: New Delhi, 2003, pp.149-153.

9. OECD guidelines for the testing of chemicals-acute oral toxicity. Adopted 23rd March 2006, pp. 1-27.

10. Harrison TR et al. Harrisons Principles of Internal Medicine, McGraw-Hill Medical Publishing Division.16th edition, 2005, pp. 71-1701.

11. Joseph TD et al. Pharmacotherapy A pathophysiologic Approach, McGraw-Hill Medical Publishing Division, 7th edition, 2008, pp. 723-810.

12. Sharma RK, Rajani GP, Sharma V, Komala N. Effect of ethanolic and aqueous extracts of Bauhinia variegata Linn. on gentamicin induced nephrotoxicity in rats. Indian Journal of Pharmaceutical Education and Research 2011; 45(2): 192-198.

13. Lakshmi BVS et al. Protective effect of Bauhinia purpurea on gentamycin-induced nephrotoxicity in rats. Indian Journal of Pharmaceutical Sciences 2009; 71(5): 551-554.