AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: http://www.ajptr.com/

Nephroprotective Activity of Polyherbal Methanolic Extraction in Rats

Chitta Venkateswararao[1]*, K. Venkataramana[1], V.V. Rajesham[2]

1 A.S.N Pharmacy College,Burripalem road, Tenali

2 Vijaya college of pharmacy, munganoor, hyathnagar, Hyderabad.

ABSTRACT

Kidneys are complex organs, which perform several important functions. Though the formation of urine is their most obvious role, but they also perform the vital co-ordination of water and salt metabolism, acid-base balance and secretion of hormones. The effects of occupational or therapeutically exposure to toxic metals on kidney have been known for many years. A large number of chemicals in common usage are potential nephrotoxic viz. Glycols (plastics solvents), paints, lacquers, cosmetics and flavouring extracts. The nephropreotective activity of the poly herbal formulation (composed of the extracts from *Terminalia chebula, tinospora cordifolia, Phyllanthus emblica, Portulaca oleracea*) was evaluated in Gentamicin induced nephrotoxicity in rats, Gentamicin like other aminoglycoside antibiotics causes nephrotoxicity by inhibiting protein synthesis in renal cells. The serum creatinine and blood urea nitrogen (BUN) were found to be significantly increased in rats treated with only gentamicin, whereas treatment with PHME the effect of gentamicin indicating nephroprotective activity. Among various doses, 200mg/kg, 400mg/kg has shown good nephroprotective activity.

Keywords: Terminalia chebula, tinospora cordifolia, Phyllanthus emblica, Portulaca oleracea,PHME

*Corresponding Author Email: chitta_2013@rediffmail.com

Received 13June 2014, Accepted22 June2014

Please cite this article as: Venkateswararao C. *et al.*, Nephroprotective Activity of Polyherbal Methanolic Extraction in Rats. American Journal of PharmTech Research 2014.

INTRODUCTION

Nephropathy is widely encountered among the people of entire world irrespective of the age, racial, environmental, and geographical variability. The etiology behind this complication is broad ranging from substance-induced to various metabolic and physiological disturbances, paneling nephropathy among the 10 leading causes of death across the world[1].

Antioxidants may be defined as radical scavengers which protect the human body against free radicals that may cause pathologyical conditions such as ischemia, anaemia, asthma, arthritis, inflammation, neurodegenertion, Parkinson's diseases, mongolism, ageing process and perhaps dementias[2]. Experiment evidence suggests that free radicals (FR) and reactive oxygen species (ROS) can be involved in a high number of diseases. Numerous physiological and biochemical processes in the human body may produce oxygen-centered free radicals and other reactive oxygen species as byproducts. Overproduction of such free radicals can cause oxidative damage to biomolecules (e.g. lipids, proteins, DNA), eventually leading to many chronic diseases, such as atherosclerosis, cancer, diabetes, aging, and other degenerative diseases in humans[3]. Gentamicin is an important aminoglycoside anti-biotic commonly used in treating life-threatening gram-negative infections[4]. However its usefulness is limited by signs of nephrotoxicity, which may occur in 13-30% of treated patients[5]. Lipid peroxidation may occur in the course of Gentamicin administration[6], giving rise to free radicals[7], which are highly toxic to tissue[8]. Oxidation and necrosis by apoptosis may occur. Several plant products are known to exhibit credible medicinal proper ties for the treatment of kidney ailments and need to be explored to identify their potential application in prevention and therapy of human ailments.

The major chemical constituents of the plant are steroids, cardiac glycosides, flavonoids, tannins and polyphenols. Hence the present study was undertaken to evaluate nephroprotective potential of PHME in Gentamicin induced biochemical and histopathological changes.

MATERIALS AND METHODS

Plants:

Almost all the plant materials were collected from the forest region of Tamil Nadu and they were identified and authenticated by Dr. Vastavya S. Raju, Department of Botany, Kakatiya University, Warangal**.**The parts proposed for this study were separated from the whole plant and kept for air drying under shadow (i.e. avoiding direct exposure to sunlight) and were subjected for size reduction.

A. Preparation of Poly Herbal Extract

A wide range of solvents with increasing polarity were chosen.

Step.1:

In a 250ml round bottomed flask, weighed quantity of powdered drug were macerated with the respective solvents in the ratio of 1:2 (i.e. 50gm in 100ml) and kept with occasional shaking for a period of 72 hrs. After the maceration process, the active ingredients present in the supernatant solvent were collected in Petri dishes and concentrated under reduced pressure.

Step.2:

These extracts were labeled and its chemical constituents were identified, among the different solvent extracts, the extract possessing more number of active compounds were selected and prepared for bulk extraction similar as step 1.

ANIMAL STUDIES:

Toxicity studies

Albino rats (200-250gm) of either sex were selectedand segregated in to 8 groups of 6 animals each. Single dose of methanolic extract of polyherbal formulation, starting from the minimal dose of 50mg/kg up to 3000mg/kg administered orally. The drug treated animals were observed carefully for its toxicity signs and mortality. From the maximum dose, $1/5^{th}$ and $1/10^{th}$ of the concentration was considered as therapeutic dose for further study.

Animals

Albino rats (175-225gm) of either sex and of approximate same age used in the present studies were procured from Central Animal facility, Vijaya college of Pharmacy, Hyderabad, India. The animal was fed with standard pellet diet and water *ad libitum*. All the animals were housed in polypropylene cages. The animals were kept under alternate cycle of 12 hours in darkness and light. The animals were acclimatized to the laboratory condition for a one week before starting the experiment. The experiment protocols were approved by Institutional Animal Ethics committee after securitization (IAEC No: P22/VCP/IAEC/2013/3/VVR/AE2). The animal received the drug treatment by oral gavage tube.

Methods:

Nephroprotective activity by Gentamicin Induced Nephrotoxicity in Rats:

The evaluation of the ethanolic and aqueous extracts for nephroprotective activity was done according to the procedure given in the literature with minor modifications.Total 36 animals were taken and 6 rats were allotted in each of the following groups;

Group I: Control group

Group II: Gentamicin control group (60mg/kg)

Group III: Gentamicin + PHME (200mg/kg)

Group IV: Gentamicin + PHME (400mg/kg)

Activity profile of the test formulations in Gentamicin induced changes in different parameters

Serum uric acid is the end product of purine catabolism. So, any defect in the glomerular filtration rate causes the rise in the level of uric acid in the blood .The raise after Gentamicin can be attributed to the GFR impairment. The decrease in the elevated uric acid by any substance may be due to the antagonism of Gentamicin induced disturbance in the glomerulus. Creatinine clearance gives the glomerular filtration rate. Administration of Gentamicin leads to significant elevation of serum creatinine level indicating injury to the glomerular apparatus. The reversal of the elevation by any substance may be indicative of the reversal of the GFR impairment.[9, 10]

RESULTS AND DISCUSSION:

Nephroprotective activity by Gentamicin induced Nephrotoxicity in albino rat's model:

Gentamicin like other amino glycoside antibiotics causes Nephrotoxicity by inhibiting protein synthesis in renal cells. The serum creatinine and blood urea nitrogen (BUN) were found to be significantly increased in rats treated with only Gentamicin, whereas treatment with PHME the effect of Gentamicin indicating nephroprotective activity. Among various doses, 200mg/kg, 400mg/kg has shown good nephroprotective activity. Results were showed in Table 1 and figure 1, 2 and 3.

Table 1:% of Body weight change in Gentamicin induced Nephrotoxicity in albinorats.

Groups	% of body weight change
Normal control	3.44 ± 0.190
Toxic control	9.926± 0.448***
PHME (200mg/kg)	8.216 ± 0.410***
PHME (400mg/kg)	5.776 ± 0.463**

Values are expressed in mean±SEM where n = 6, Significant at P < 0.05*, 0.01** and 0.001***, .compared to control group.

Table 2: Blood urea and serum creatinine levels of different groups by gentamicin induced Nephrotoxicity

Groups	Blood urea	Serum creatinine
Normal control	31.03± 5.018	1.023± 0.053
Toxic control	70.591 ± 4.064***	2.05± 0.081***
PHME (200mg/kg)	57.385 ± 11.724**	1.918± 0.07***
PHME (400mg/kg)	45.916 ± 11.65*	1.53 ± 0.11***

Values are expressed in mean±SEM where n = 6, Significant at P< 0.05*, 0.01** and 0.001***,

compared to control group.

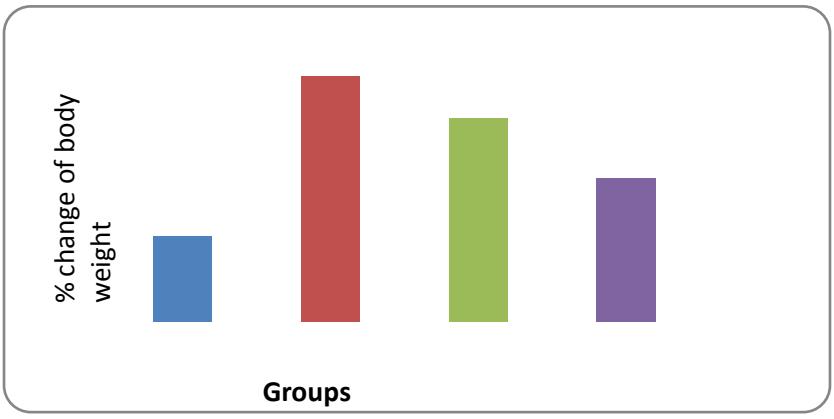

Figure 1: % of Body weight changes in different groups by Gentamycin induced Nephrotoxicity model

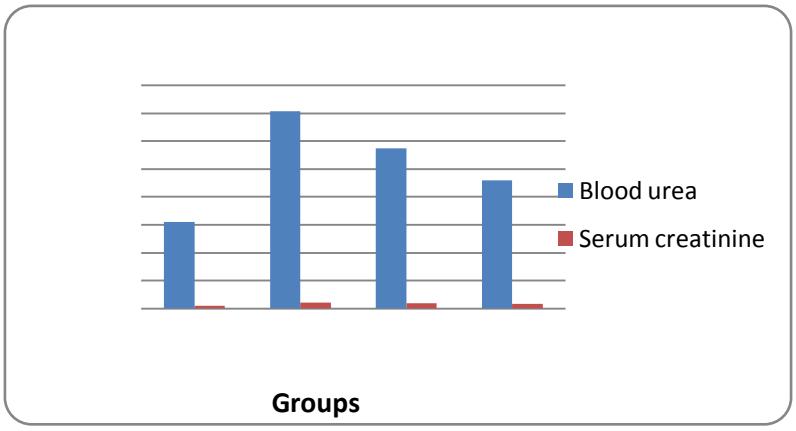

Figure 2: Blood urea level of different groups in Gentamicin induced Nephrotoxicity model

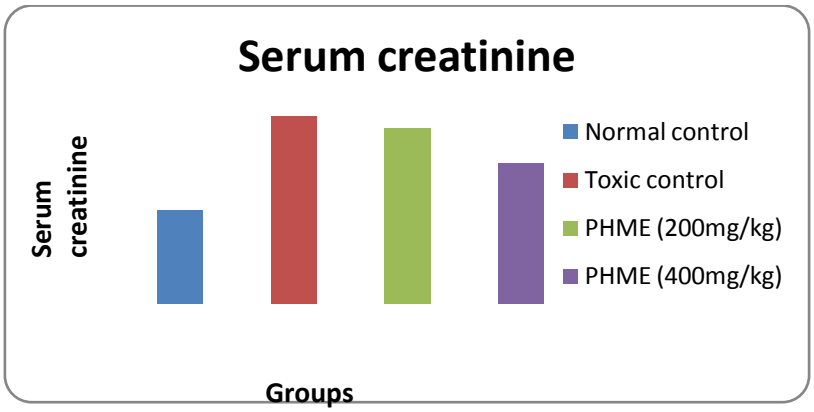

Figure 3: Serum creatinine level of different groups in Gentamicin induced Nephrotoxicity model

CONCLUSION:

In the present study it is observed that due to the presence of phyto constituents like alkaloids, flavonoids, saponins and tannins which also reduce the oxidative stress and nephroprotective

activity may be responsible for above phytoconstituents. However, the exact mechanism responsible for activities is currently unclear. Therefore, further investigations need to be carried out to isolate and identify specific compounds present in the plant extract responsible for these activities and exact mechanism.

REFERENCES:

1. Zhang JG, Lindup WE. Role of mitochondria in Cisplatin - induced oxidative damage exhibited by rat renal cortical slices. Biochem Pharmacol 1993; 45:2215-22.
2. Naznin Ara, Hasan Nur. In vitro antioxidant activity of methanolic leaves and flowers extracts of Lippia Alba. Research Journal of Medicine and Medical Sciences 2009; 4(1):107-110.
3. Jain PK, Agrawal RK. Antioxidant and free radical scavenging properties of developed mono- and polyherbal Formulations. Asian J. Exp. Sci., 2008; 22 (3): 213-220.
4. Ali BH. Gentamicin nephrotoxicity in human s and animals: Some recent research. Gen Pharmacol 1995; 26: 1477-87.
5. Mathew TH. Drug-induced renal disease. Med J Aust 1992; 156: 724-28.
6. Ramsammy L, Ling KY, Josepovitz C, et al. Effect of gentamicin on lipid peroxidation in rat renal cortex. Bioc hem Pharmacol 1985; 34: 3895-900.
7. Yang C, Du X, Han Y. Renal cortical mitochondria are the source of oxygen free radicals enhanced by gentamicin. Renal Fail 1995; 17: 21-26.
8. Feldman S, Wang M, Kaloyanides GJ. Aminog lycosides induce a phospholipidosis in the renal cortex of the rat: An early manifest ation of nephrotoxicity. J Pharmacol Exp Therp 1982; 220: 514-20
9. Shivalinge KP and Vrushabendra BM; Study of nephroprotective activities of stem bark extracts of Ficus racemosa in gentamicin induced acute renal failure in rats Int J Pharma Chemical Sci 2012;1(1):314-318.
10. Saifuddin K, Hakeemuddin K, Aaftab A and Shahid A; Nephroprotective effect of the ethanolic extract of Lantana camara Linn flower on acute dose of Cisplatin induced renal injured rats; Rajiv Gandhi university of Health Sciences J Pharma Sci 2012;2(2):68-77.