International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol. 3, No.1, pp 553-555, Jan-Mar 2011

Protective Effect of the Aqueous Extract of *Momordica charantia* Leaves on Gentamicin Induced Nephrotoxicity in Rats

Chaware V.J.*, Chaudhary B.P., Vaishnav M.K., Biyani K.R.

Anuradha College of Pharmacy, Chikhli, Dist.-Buldana, M.S.,India

Corres.author: vitthaljchaware@Rediffmail.com, Contact no.-9881390406

Abstract: The aim of present study was to evaluate the preventive effect of aqueous extract of *Momordica charantia (MC)* leaves on gentamicin induced nephrotoxicity in albino wistar rats. Gentamicin (40mg/kg/day, i.p.) was administered to all the groups except normal control group for 14 days. Aqueous extract of MC leaves (100 mg/kg/day & 200mg/kg/day, p.o.) was given orally before intoxication of each dose for 14 days. On 15th day, blood samples for serum urea and creatinine, were withdrawn by puncturing retro orbital sinus. The protective effects were evidenced by a complete inhibition of the gentamicin induced elevation of serum blood urea nitrogen and complete blockage of gentamicin induced elevation of serum creatinine.
Key words: *Momordica charantia* Leaves, Gentamicin Induced Nephrotoxicity, Nephrotoxicity,Rats.

Introduction

The plant *Momordica charantia* (cucurbutaceae) is native of India. The leaves of the plant are useful in diarrhea and dysentery and having laxative property. The leave are having considered antipyretic activity and given in delirium. Nephrotoxicity of the drugs are usually associated with their accumulation in renal cortex, dependent upon their affinity to kidney and on kinetics of drug trapping process. Gentamicin usually accumulates in the renal proximal tubule and enhances hydrogen peroxide generation by the mitochondria, which is mainly derived from the dismutation of super oxide[1].

Objective

To study nephroprotective activity of aqueous extract of *Momordica charantia* leaves against gentamicin induced nephrotoxicity in rats.

Materials & Methods

Collection of plant material

MC leaves were collected from local area of Buldana District and were authenticated by Department of Botany, R.T.M. Nagpur University, Nagpur.

Plant extraction

1 kg of dried powdered leaves of MC was completely extracted with 50% distilled water & 50% ethanol by maceration for 7 days. The crude extracts obtained were concentrated under reduced pressure and control temp. (42°C-45°C) and kept in dessicater for future use.

Animals

Albino wistar rats of either sex weighing 150-200gm were obtained from Animal House of Anuradha College of Pharmacy, Chikhli District Buldana. The

animals were kept in polypropylene cages & fed with standard pellet diet and water ad libitium at all time, maintained at an ambient temperature of 25ºC ± 2°C and relative humidity 50% ± 15% under 12hr light/dark cycle. The study was conducted after approval by the Institutional Animal Ethical Committee.

Nephroprotective activity

Nephroprotective activity was evaluated by using gentamicin induced nephrotoxicity in albino wistar rats. Albino wistar rats of either sex were divided into four Groups of six animals each. Group I served as normal control ,received normal saline , group II served as toxic control, received gentamicin (40mg/kg/day,i.p.),group III & IV served as test, received aqueous extract of leaves of MC (100 mg/kg/day & 200mg/kg/day,p.o.) for 14 days.

Biochemical Assay

Prior to termination of experiment on 15 days; blood sample were withdrawn by puncturing retro orbital sinus. Serum creatinine & blood urea were assayed using Radox diagnostic kits (Redox laboratories Ltd., crumlin, UK) by method of Varley and Alan, 1994.

Statistical Analysis

Results were expressed as mean ± standard error of mean (SEM) of six observation and statistically analyzed by using one way ANOVA followed by Dunnett's test. $P<0.01$ was considered to be statistically significant.

Results

Effect of 14 days of oral administration of two dose level of aq. extract of MC leaves (100mg/kg/day & 200mg/kg/day, p.o.) on blood urea & serum creatinine concentration against gentamicin induced nephrotoxicity in rats for 14 days.

Table-1 shows that the effect of two doses of aq. extract of MC leaves on the circulating serum creatinine and blood urea concentration in gentamicin treated rats. Single daily administration of gentamicin (40mg/kg/day, i.p.) for 14 days, was associated with significantly elevation ($P<0.05$) in circulating level of serum creatinine & blood urea in group II rats when compared with group I (normal control). However, significantly elevation in serum concentration of these measured parameter were significantly ($P<0.01$) attenuated by the two doses of aq. extract of MC leaves (100mg /kg/day & 200mg/kg/day, p.o.), also in dose dependent manner.

Discussion

The use of gentamicin, an aminoglycoside antibiotic with a wide spectrum activities against gram-positive & gram negative bacterial infection but high preference for the latter[1,] is equally associated with nephrotoxicity as its side effect[2,3].Thus gentamicin induced nephrotoxicity is well established experiment model of drug induced renal injury [4,5].

Table 1: Effect of gentamicin (40mg/kg/day i.p.) & aq.extract of MC leaves (100mg/kg/day & 200mg/kg/day, p.o.) on serum creatinine & blood urea in treated rats for 14 days.

Groups	Drug treatment	Serum creatinine (mg/dl)	Blood urea (mg/dl)
I (Normal Control)	Vehicle (distill. water) (10 ml/kg, p.o.)	0.42±0.07	16.69±2.10
II (Toxic Control)	Gentamicin (40 mg/kg/day, i.p.)	1.38±0.13	58.67±4.07
III (Test I)	Gentamicin (40 mg/kg/day, i.p.)+ Aq. extract of MC leaves (100 mg/kg/day, p.o.)	0.88±0.15	35.50±4.10
IV (Test II)	Gentamicin (40mg/kg/day, i.p.)+ Aq. extract of MC leaves (200 mg/kg/day, p.o.)	0.69±0.07	30.50±2.39

Values are mean ± SEM. $P<0.01$ was considered to be statistically significant.

Many animal experiments have demonstrated overwhelmingly the positive correlation between oxidative stress & nephrotoxicity[6]. Gentamicin induces nephrotoxicity by causing renal phospholipidosis through inhibition of lysosomal hydroxylase, such as sphingomylinase & phospholipidase in addition to causing oxidative stress [5]. This drug induced nephrotoxicity are often associated with marked elevation in blood urea nitrogen & serum creatinine . Thus biochemical parameters such as blood urea, creatinine clearance, enzyme urea & urinary excretion of B_2 macroglobulin are used to investigate drug induced nephrotoxicity in animals & man[7].

In present study, drug induced nephrotoxicity was established by single daily intraperitoneally injection of gentamicin for 14 days. This toxicity was characterized by ($P<0.05$) elevation in the circulating level of blood urea nitrogen & serum creatinine in group II, when compared to untreated group I rats. However, these change were attenuated by pretreatment with two dose level daily of aq. extract of MC leaves for 14 days. Aq. extract of MC leaves at two dose level(100mg /kg/day & 200mg/kg/day,p.o.) significantly lowered acute elevation serum concentration of blood urea nitrogen & serum creatinine , maintaining their values within the normal range when compared to toxic control rats (group II). Apart from the direct nephrotoxic effect of gentamicin in group II, the acute elevation in the measured biochemical parameters could also be attributed to increased catabolic state in rats due to the prolonged anorexia associated with gentamicin.

Conclusion

The overall result of this study showed aqueous extract of MC leaves can offer protection against the deleterious renal side effect of gentamicin.In the near future MC leaves would constitute a lead to discovery novel drug which will be in the treatment of drug induced nephrotoxicity.

References

1) Chambers, H.F., 2001. Antimicrobial Agents: The Amino glycosides. In: Hardman, J.G., Limbird, L.E., Goodman and Gilman's, A.G., (Eds.), The Pharmacology Basis of Therapeutics, 10th ed., McGraw-Hill Medical publishing, New York, USA, pp.1219-1238.
2) Apple,G.B.,1982.Aminoglycoside nephrotoxicity:Physiological study of the site of nephrone damage.In:Whelton,A.,Neu,H.C.(Eds.),The Amino glycoside :Microbiology, Clinical use, and Toxicity. Marcel Dekker Inc., New York, USA, pp.269-282.
3) Barry, M.B., 2000.Toxic Nephropathies. The Kidneys, vol. 2, W.B. Saunder Company Philadelphia, pp. 3-67.
4) Emeigh Hart,S.G.E.,Beierssehmit,W.P.,Wyand,D.S.,Khair allah,C.A.,Cohen,S.D.,1994. Acetoamino -phen nephrotoxicity in CD-1mice.l.Evidence of a role for in situ activation in selective covalent binding and toxicity. Toxicology and applied phamacology126, 267-275.
5) Cojocel, C., 1997.Aminoglycoside nephrotoxicity. In:sipes,,I.G., McQueen, C.A.,Gandolfi, A.J.,(Eds.),Comprehensive Toxicology, Vol.7, Elsevier, Oxford, pp.495-524.
6) Devpriya, S., Shyamaladevin, C.S., 1999.Protective effect of quercetinin in cisplatin induced cell injury in rat kidney. Indian Journal of Pharmacology, 31, pp.422.
7) Adelman,R.D,Siangler,W.L.,Beason,F.,Ishizaki,G. ,Conselman,G.M.,1981.Frusemide enhancement of nettimicin nephrotoxicity in dogs. Journal of Antimicrobial and Chemotherapy, pp.431-435.

*****