ORIGINAL ARTICLE

Effect of Corn Silk Extract on Renal Functions in Acetaminophin Induced Nephrotoxicity in Mice

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ABSTRACT

Aim: To evaluate the effects of corn silk on renal functions in acetaminophin induced nephrotoxicity
Study design: Experimental Study.
Settings: Anatomy Department. University of Health & Sciences Lahore. FromFebruary,2012 to February, 2013.
Methods: Twenty seven male albino mice of age 6-8 weeks and weight 30 ± 5 gm were used. The control Group A wastreated with singleinjection of 16.6ml/kg normal saline on day one of the study via intraperitoneal route and was sacrificed on day ten. Group B was treated with single intraperitoneal injection of acetaminophen (600 mg/kg) and was sacrificed after 2 days. Group C was administered single intraperitoneal injection of acetaminophen (600 mg/kg) on day oneof the experiment followed by theoral gavage of corn silk (CS) extract 400 mg/kg for next 8 days and then sacrificed on day ten. For blood samplingCardiac puncture was performed.
Results: A statistically significant raised ($p < 0.005$) levels of serum urea and creatinine in group B wereobserved. In groups C serum urea and creatinine levels were significantly reduced.
Conclusion: The results of present study suggest CS extract provides protection against acetaminophen induced rephrotoxicity.
Keywords: Acetaminophen, Nephrotoxicity, Corn Silk, Mice, Serum urea and creatinine.

INTRODUCTION

Acetaminophen is used for management of pain, fever and osteoarthritis[1] owing to its antipyretic andanalgesic effects[2]. Prostaglandins are inflammatory mediators that are blocked by acetaminophen by inhibiting cycloxygenases[2]. Acetaminophen is readily absorbed after ingestion[3]. First phase of metabolism is completed in liver. Approximately 15 percent of drug is oxidized into a toxic metabolite, N-acetyl-p-benzo-quinine imine (NAPQI) by cytochrome P-450 ssytem in liver[2].

Over dosage of acetaminophen causes acute renal tubular necrosis throughconsumption of glutathione (an antioxidant system) and covalently binding the reactive metabolite to vital cell constituents[4].

The long silky hairs of stigma and styles of the maize plant are the corn silk. It had long been used for the treatment of edema, gouty arthritis, urinary bladder infection, kidney stones, nephritis, prostatitis and diabetes mellitus[5,6].It is a mild diuretic and demulcent. CS constituents include amines, saponins, pigments, fixed oils, resins, flavanoids, alkaloids, chlorogenic acid, tannins, phytoesterols, allantoin[7].

MATERIAL AND METHODS

Acetaminophen was procured from Merck Pharmaceuticals. 600mg of acetaminophen powder was dissolved in 16.6mlnormal saline. CS extract was prepared by a rotating evaporator at PCSIR Laboratories complex, Lahore. 100gm CS was dissolved in 1000ml methanol (80%). 2000mg ofCS extract was dissolved in 50ml of distilled water. Mouse Dose of CS extract was calculated 400mg/kg/day with the help of dose conversion formula[8]. Three experimental groups (A, B & C) consisting of nine animals were randomly selected.

3ml of blood was collected via cardiac puncture exchanged to vacutainer. Blood was permitted to remain for one hour before centrifuging it at a speed of 3000 cycles per minute. The clear serum was gathered and stored at -20ºC. Serum urea and creatinine levels were estimated by utilizing commercially accessible kits.

Statistical analysis:

DataowasoanalyzedothroughoSPSSoversiono18.Mean and standard deviation was calculated for quantitative variables. One way ANOVA was applied to compare variables and afterward post Hoc Tukey Test. Aup value < 0.05uwas considereduasustatisticallyusignificant

RESULTS

Serumuureaulevelsuof acetaminophen injected group B were significantly raised as compared to control group A ($p=0.001$), whereas serum urea levels were significantly reduced ($p=0.001$) in the treatment group C when compared to group B (Table 2). Mean serum creatinine level of toxic group B was significantly increased when compared with control group A ($p=0.001$), while mean serum creatinine level of group C receiving CS extract was significantly reduced when compared with that of group B($p=0.001$)

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Table 1 Experimental Groups

Group	Intervention	Dosage/day	Route	Schedule	Sacrificed
A	0.9% N. Saline	17ml/kg	Intraperitoneal	1st day	10th day
B	Acetaminophen	600 mg/kg	Intraperitoneal	1st day	After 48 hours
C	Acetaminophen CS extract	600mg/kg 400mg/kg	Intraperitoneal Oral	1st Day 2nd to 9th Day	10th day

Table 2. Comparison of Mean serum urea & Mean serum creatinine level b/w groups A, B, & C.

Factor	Group A (Mean±SD)	Group B (Mean±SD)	Group C (Mean±SD)	p-value
Serum urea (mg/dl)	44.49±7.52	83.15±6.25	60.97±5.46	0.001*
Serum creatinine (mg/dl)	0.46±0.11	1.98±0.26	1.18±0.25	0.001*

* p≤0.05 is considered statistically significant.

DISCUSSION

CS constituents, owing to its antioxidant activity, are broadly reported to defend several organs against oxidative damage[6]. The present work is designed to assess the consequences of CS extract on renal damage produced by toxic dose of acetaminophen in mice.

Serum urea and serum creatinine (renal profile) of group B micewere significantly increased in comparison to the mice in group A. This phenomenon is proven to be dueoxidative stress provoked by acetaminophen in past studies[9].Khosandi and Orazizadeh[10] also reported impaired renal status after ingestion of 500mg/kg of acetaminophen in mice. The decline inmean serum urea of group Cwas statistically significant when compared with group B which showed that CS extract has some protective role against acetaminophen induced renal damage. Mean value of serum creatinine in group Cwas statistically significant when compared with group B. It showed that CS treatment has lowered the serum creatinine value which suggests that CS has a protective role against acetaminophen induced nephrotoxicity. Sepehriet al[8] also documented that methanolic extract of CS alleviated the nephrotoxic action of gentamicin in the adult male rats.

Acetaminophen over dosage raises the NAPQI concentration due to saturation of sulfate and glucoronide pathways for its routine clearance so it is shunted to cytochrome P-450 system. NAPQI spontaneously traps cellular proteins and leads to the oxidative stress induced cell death[9].

Eugenol, R-terpineol and citronellol are volatile oxygenated chemicals present in CS which act as antioxidants. Antioxidant, anti-inflammatory and clearanceof free radical properties of CS clarifies its nephroprotectiveactivity[11].

Present study revealed that CS extract significantly reduced renal biochemical parameters i.e., plasma urea and creatinine. This points outs that considerable protection is offered by CS extract.

CONCLUSION

The results of present study suggest that acetaminophen at a dose of 600mg/kg body weight leads to renal function impairment while CS extract protects acetaminophen induced renal injury.

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