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The Extraction of Cinnamon and its Antioxidant Effects of it on Free Radicals

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Abstract

Background: Environmental lead exposure continues to be a public health problem. The kidney is one of organs that is exposed to the side effects of lead. Cinnamon contains large amounts of phenol antioxidants that has protective effects against free radicals. This study investigated the antioxidant effect of cinnamon on renal parameters. **Materials & Methods:** In this experimental study, thirty-five wistar female rats were divided into 7 groups of 5 each: control group received no treatment, sham group (0.2 ml saline normal), third group (0.5 g/kg of cinnamon extract), fourth group (0.6 g/l lead acetate), and fifth group (0.6 g/l lead acetate in addition to 0.5 g/kg cinnamon extract). At the end of the study, BUN, creatinine and uric acid concentrations were measured. **Results:** The results showed that the concentration of BUN, creatinine and uric acid had significant increased in lead group compared to the other groups ($p < 0.05$). The cinnamon reduced these parameters significantly when used with lead. **Conclusion:** It can be concluded that cinnamon extract with its antioxidant properties reduces the side effects of lead on mean concentrations of renal physiological parameters.

Keywords: Cinnamon, Lead, Kidneys, Uric acid, Creatinine, BUN.

Introduction

Association between lead poisoning and renal diseases in humans has been recognized by several studies. (1) Lead causes renal dysfunction, disrupting uric acid metabolism and may lead to gout (2). It has an effect on renal tubules which results in protein excretion from the urine (3). Cinnamon (*Cinnamomum Verum*) is native to Srilanka and India (4). Its compounds include cinnamic acid, phenolic compounds such as eugenol, flavonoid, catechins and peranthocyanin safrole, terpene compounds such as limonene, valine halide, trans cinnamaldehyde, tannin, coumarin, resin. Most of the plant's compounds is cinnamaldehyde (5). Cinnamon has several properties including antioxidant properties (6&7).



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The methanolic extracts of cinnamon contain antioxidant compounds that affect on anion superoxide, radical hydroxide and other free radicals (8).

Kidney damage and hypertension may occur after years of contact with lead. Studies have shown that some people with hypertension and kidney failure have been exposed to lead in childhood. Generally, lead-induced nephropathy results from prolonged contact (2). In acute exposure to lead, renal lesions develop in the form of irreversible tubular atrophy. Another complication is Fanconi's syndrome, which manifests itself with complications of proteinuria, hematuria and pyuria in the urine (9). The tests evaluating blood urea nitrogen and creatinine can be used to detect the renal effect caused by the occupational exposure to lead (10). Regarding the antioxidant effects of cinnamon, the aim of this study was to investigate the protective effects of cinnamon extract against lead-induced toxicity on physiological kidney parameters in adult female rats.

Material & Methods

35 adult female Wistar rats were kept in darab animal room under controlled conditions at $23 \pm 23^\circ \text{C}$, 12 hours of light and 12 hours of darkness for adaptation to the environment for two weeks. Then, animals were randomly divided into 5 groups of 7 as follows:

Group 1: In normal condition, no drug was received (control group).

Group 2: received 0.2ml saline normal (sham group) daily for 14 days.

Group 3: received 0.5 g/kg of cinnamon extract daily for 14 days.

Group 4: received 0.6 g/l of lead acetate daily for 14 days.

Group 5: received 0.5 g/kg of cinnamon extract with 0.6 g/l of lead acetate daily for 14 days.

At the end of study, animals were anesthetized, the blood samples were taken from them and the urea nitrogen (BUN), creatinine and uric acid parameters were measured using by enzyme kit (Pars test company) and Hitachi's Automatic Analyzer 902. Data were analyzed by using SPSS software one way ANOVA.

Results

Comparison of the results of statistical tests among the studied groups showed that sham and cinnamon groups had not significant differences in renal physiological parameters ($P > 0.05$). Lead received group had a significant increase in BUN, uric acid and creatinine compared to the control and cinnamon group ($P \leq 0.05$). The fourth group showed a significant decrease in all parameters compared to the lead group ($P \leq 0.05$), (Table1).



Table 1- Mean \pm S.E of BUN, creatinine and uric acid level in experimental groups

Group	Control	Sham group	Cinnamon group	Lead group	Cinnamon & lead group
Parameters					
BUN	49.95 \pm 1.25	49.85 \pm 1.34	49.00 \pm 1.47	57.84 \pm 1.18*	52.25 \pm 1.75**
Creatinine	0.6 \pm 0.09	0.55 \pm 0.11	0.57 \pm 0.2	0.88 \pm 0.15*	0.65 \pm 0.05**
Uric acid	5.70 \pm 0.35	5.23 \pm 0.14	4.95 \pm 0.37	6.1 \pm 0.09*	5.03 \pm 0.33**

*. Significant differences with other groups

**. Significant differences with lead group

Discussion

Epidemiologic studies have shown an association between blood lead levels and Blood pressure and hypertension is a cardinal feature of lead nephropathy (11). The antioxidants play an important protective role against radicals and inhibit radicals (12). This study showed that Concurrent consumption of hydroalcoholic extract of cinnamon and lead decreased uric acid, creatinine and BUN in comparison with lead group. This mean that the extract has an effective protective effect in the kidney against damage caused by the lead and cinnamon as an antioxidant had a significant role in reducing the side effects of lead on kidney physiological parameters. studies showed that Cinnamon extract reduces the side effects of lead on concentrations of sex hormones in female rats in a dosedependent manner (13).

Lead acetate is a peroxidation and peroxidation damage to cell membrane lipids leads to breakdown and permeability of the membrane Antioxidants create a defensive mechanism that neutralizes free radical damage (14). Probably lead through lipid peroxidation leads to the production of free radicals, and increased free radicals reduce the activity of antioxidants (15).

In this study, probably lead increased levels of creatinine, BUN and uric acid in the kidneys by breaking DNA and decreasing the lipid peroxidation and free radicals leads to a decrease in blood flow and increases BUN, creatinine, and uric acid in the blood. **Conclusion**

According to the results of this study, it can be concluded that lead has a disructive effect on kidney and serum levels of BUN, creatinine and uric acid, and the use of antioxidant extract of cinnamon improves rate serum kidney factors. Therefore, cinnamon extract can be used to reduce the side effects of lead.



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