Evaluation of Goji Extract and Charcoal as Antioxidant on T-2 Toxin Administration On Liver Male Mice

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Abstract

With a view to study the effects of exposure to T-2 toxin and their amelioration by Goji extract or charcoal, male mice were treated with a sublethal dose of T-2 toxin (200 µg/kg B.W) intraperitoneally. T-2 Toxin showed an increase (P ≤ 0.05) in blood of ALT, ALP, Total Lipids, TAS, and TNF. These were decreased by Goji extracts or charcoal, and were improved partially by the two treatments. It is concluded that the treatment of rats with Goji extract or charcoal ameliorated the adverse effects of toxins but the results suggest that Goji extracts may be used as antioxidant and antidote rather than charcoal for T-2 Toxin in mice.

Keywords
T-2 Toxin, Goji Extract, Activated Charcoal, Liver, Serum, Mice

1. Introduction

T-2 Toxin mycotoxin [3 α-hydroxy, 4 β, 15-diacetoxy–8 α (3ethylbutryloxy) 12, 13-epoxytrichothece–gene] (Figure 1) is a toxic metabolic produced by certain Fusarium species. This toxin is one of the most important trichothecene mycotoxins occurring naturally in Agricultural products [1] and is involved or conjecturally Associated with serious field cases of human toxicoses [2]. In Egypt, T-2 Toxin has been detected in seeds and grains [3]. Activated charcoal was used to prevent toxicosis and death in rats given T-2 Toxin [4]. Also, [5] used Goji extracts as antioxidants on the adverse effects of roridin E as mycotoxin.

In addition [6] used Activated charcoal as antioxidants and antidote for trichoverrins [A & B] [1:1] in rats. The primary aim of this investigation was to describe biochemical changes of the liver as a result of administering mixture Albino male mice from T-2 toxin and to evaluate the possible protective effect of Goji (Figure 2).
extracts and charcoal as also antioxidants on T-2 toxin induced hepatotoxicity in male adult mice.

2. Materials and Methods

T-2 Toxin obtained from sigma chemical Co.ST. Louis, USA. Activated charcoal was obtained from BDH [England] Goji dried fruits were collected from china market. Other kits were from Biovision, USA.

The study was performed on inbreeding 6 weeks white male mice MF1 (40 animals) each weights 29 - 32 g. Animals were divided into 4 groups (10 mice each) and were subjected to the following schedule of treatments.

Control: which was gavage fed with propylene glycol and left for 2 weak before dissection.

T1: was gavage fed with a single dose of 200 µg/kg B.W of T-2 toxin, dissolved in propylene glycol and kept on normal feed for 2 weeks.

T2: was gavage fed with a single dose of 200 µg/kg B.W (T2 Toxin) and was followed immediately by charcoal at 1g/kg B. W but left for 2 weeks.

T3: was gavage fed with a single dose of 200 µg/kg of T-2 toxin and was followed crude water extract of Goji (2 mg/ kg) using Gastric tube in all groups for 2 weeks.

After 2 weeks of injection, all rats were anesthetized using ether, blood samples were collected from the heart and serum was separated by centrifugation at 5000 rpm for 10 minutes and stored at −20°C until analysis.
zymatic activity of ALT was assessed as described by [7], level of alkaline phosphate (ALP) was measured according to [8]. Also, total serum lipids was estimated by The method of Frings et al. [9]. In addition, total antioxidants (TAS) concentration was measured according to [10], while ferritin was measured according to [11]. In addition, TNF was determined according to the method of Beutler and Ceramic [12].

3. Results and Discussion

The present study determine the effect of T-2 toxin in male mice and has focused on its effect on liver function and evaluate the possible role of charcoal and Goji extract in reversing T-2 toxin toxicity. The data in Table 1 indicate that the treatment of male mice with T2 toxin in treated one (T1) produced an increase (p > 0.05) in ALT, ALP, total lipids, TAS and Ferritten (Table 1) where as in TNF was highly significance than control groups. These results may be attributed to the varying toxic effect of T2 toxin. The above data (Table 1, Figures 3-8) are in agreement with the results obtained by Ueno [1], who reported that the trichothecenes have highly toxic effects due to a 9, 10 double bond and a 12, 13 epoxide group [13], responsible for its toxicological activity [14].

It also prevents polypeptide chain initiation or elongation by interaction with eukaryotic 60S subunit [large nucleoprotein subunit of ribosome] and interaction with the enzyme peptidyl transferase. This interaction leads to varying degrees of inhibition of peptide bond formation [13].

*Lyciumbarbarum*, as well known traditional Chinese medicinal herb, possesses diverse biological activities and pharmacological functions including reducing blood glucose, anti-aging, immune modulating, anticancer, antifatigue, and serum lipids [15] and [16]. *Lyciumbarbarum* extrat as effective free radical scavengers, was demonstrated and have antioxidant activity [17]. On the other hand, mice with T-2 toxin plus Goji [T3] were significantly decreased in all parameters as compared to the treated 1 with toxin due to the ability of goji for absorption or elimination of the mycotoxin or inhibiting its transformation resulting in the increase of its toxicity [18].

*Lyciumbarbarum* (Goji) contain pharmacologically Active constituents that offer a variety of indications that affect different organs of the body [19]. Also, the interaction may occur between joji and mycotoxin where joji act as antioxidants [5] [20] [21]. Otherwise, treatment of mice with T-2 toxin was caused an increase in the mean value in Alt, Alp, total lipids, TSA and TNF but decreased in ferritten than control groups. Also, All T-2 mycotoxin groups caused a decrease in the mean values of ferritten but the Goji ameliorate the value of ferritten than T2 toxin group.

Ferritten dependant oxidative damage which may be involved in the pathogenesis of disease which increased total antioxidants (enzymatic or non enzymatic) formation occurs and the toxicity of T-2 toxin that increases antioxidants production to mobilize ferritin. Thus, this suggestion is in agreement with [22] and [23], or may be as the result of increases urinary excretion, decreases ferritin levels and reduces liver iron in the majority of chronically transfused iron loaded patients [24]. All T-2 mycotoxin plus charcoal produced an decrease in the amount value(p > 0.05) in Alt, ALP, total lipids, TSA and TNF compared than treated [T1] group but it was non significance in TAS total antioxidants, otherwise, the T-2 toxin groups produced an increase (p > 0.05) in all parameters but give highly significance (p > 0.001) in TNF than control group. It was reported that the charcoal is an effective method for the prevention of poisoning in mice from mycotoxin [6]. The previous data confirms that Goji extract was considered as the strong antioxidant rather than activated charcoal due to Goji (*Lyciumbarbarium*)

![Table 1. Effect of T-2 Toxin (200 mg/Kg) (T1) alone and in combination with charcoal (19/kg) (T2) & also with Goji extract (5 g/kg) T3 on some biochemical parameters in serum of male mice.](image)
improves in vivo antioxidant biomarkers in serum of healthy adults and increased antioxidant efficacies in humans by stimulating endogenous factors and suggest that continued use prevent or reduce free radical-related conditions [25] and the surface area of Goji was larger than the surface area of charcoal and this lead to more adsorption of toxin substance. Further studies are required to determine the effect of these two substances as antioxidants and their mechanism against toxins in future researches.

4. Conclusion
Mycotoxins are small and quite stable molecules which are extremely difficult to remove or eradicate, and
Figure 6. Effect of T2 Toxin (200 mg/Kg) alone and in combination with charcoal or Goji extract on TAS (mmol/l) of male mice serum.

Figure 7. Effect of T2 Toxin (200 mg/Kg) alone and in combination with charcoal or Goji extract on Ferritin µg/ml of male mice serum.

Figure 8. Effect of T2 Toxin (200 mg/Kg) alone and in combination with charcoal or Goji extract on TNF (mg/ml) of male mice serum.

which enter the feed chain while keeping their toxic properties. Mycotoxins of major concern as feed contaminants and one of the strategies for reducing the exposure to mycotoxins is to decrease their bioavailability by including various mycotoxin-adsorbing agents in the compound feed, which leads to a reduction of mycotoxin uptake as well as distribution to the blood and target organs. It is found that treatment of rats with Goji extract or charcoal ameliorated the adverse effects of mycotoxins. The results suggest that Goji extracts may be used as antioxidant and antidote rather than charcoal for T-2 Toxin in mice.

References


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