Modulatory Effects of Red Grape Seed Proanthocyanidin Antioxidants on Lethality and Cardiovascular Toxicity of the Yellow Scorpion Leirus Quinquestriatus Venom

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INTRODUCTION

Scorpion envenomation is a frequent and sometimes fatal occurrence in various parts of the world, including the middle East. Regardless of the species, scorpion toxins produce pathological changes in several systems in the body such as cardiovascular, respiratory, nervous, muscular, gastrointestinal, immunological systems, and may lead to death (1). It is known that cardiovascular manifestations are the major factors in venom-induced injuries and fatal responses following experimental and human scorpion envenomation. These usually manifest as alterations of the systemic blood pressure, cardiac rhythm disturbances, myocardial damage, heart failure, pulmonary edema, respiratory failure & death (1,2,3).

Oxidative stress has been implicated in several diseases such as hypertension, cardiac dysrhythmias, and myocardial damage (4), all of which are observed following scorpion envenomation (1). Evidence indicates that antioxidants might decrease the risk of cardiovascular diseases, stabilize membranes and prevent their functional damage (5). Additionally, a recent study by Meki et al. (6) showed that scorpion envenomed children exhibited high serum levels of oxidative stress markers.

AIM OF THE WORK

The primary objective of the current study was to assess the protective effects of the GSP antioxidants against the cardiovascular toxic effects caused by the yellow scorpion Leirus quinquestriatus (LQQ) envenomation in rats.

METHODS

Lethality studies were conducted in mice. Whereby the animals were divided into three groups (n=10). Two groups were treated with 100 or 200 mg kg\(^{-1}\) day\(^{-1}\) GSP (p.o.) for 10 days. The last dose of GSP was given one hour prior to venom injection. The third group received venom injection only. All groups received either 250 or 350 µg kg\(^{-1}\) scorpion venom (s.c.). Mortality percentage, as well as time of death of the deceased animals, were recorded.

The modulatory effect of GSP on cardiovascular effects of LQQ venom was investigated in adult rats. Blood pressure, via the carotid artery was measured in anesthetized rats via a pressure transducer connected to a physiograph. Electrocardiographic tracings of standard limb leads were obtained via s.c. needle electrodes attached to an electrocardiograph. Animals were treated with GSP (100 or 200 mg kg\(^{-1}\) day\(^{-1}\)) for 10 days prior to venom injection. Venom was injected (350 µg kg\(^{-1}\), i.v.) and blood pressure (MABP), heart rate (HR), ECG changes were recorded periodically up to death.

Data were analyzed using one way analysis of variance (ANOVA) followed by multiple Tukey's post hoc test. Lethality was evaluated utilizing Wilcoxon survival analysis. P<0.05 was considered significant.

MINISTRY

Figure 1: Survival Distribution Function
Curves for Control Venom and GSP Pretreated Animals

Figure 2: Representative Blood Pressure Scan for Control LQQ Venom (350 mg kg\(^{-1}\), i.v.) and GSP pretreated Animals

Figures 3-4: ECG leads for Control Venom and GSP Pretreated Animals

RESULTS AND DISCUSSION

1- In general pretreatment of LQQ-scorpion envenomed rats with GSP significantly relieved the venom-induced cardiovascular toxicity.

2- The cardioprotective effects of GSP was evidenced by ameliorating the severe rise in MABP induced by the venom and delaying the terminal hypotension.

3- Pretreatment with GSP ameliorated the ECG changes evoked by LQQ scorpion venom including conduction defects as well as signs of myocardial infarction.

4- Moreover, survival time was significantly prolonged by GSP pretreatment.

CONCLUSION

The results of the study indicate that GSP offered significant protection against LQQ envenomation in rats. Such protection suggests that oxidative stress plays a key role in the mechanism of intoxication by the scorpion venom.

REFERENCES


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