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Cardioprotective Activity of *Solanum xanthocarpum* in Isoproterenol Induced Myocardial Infarction in Rats

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ABSTRACT

Solanum xanthocarpum (Solanaceae) is a medicinal herb which is used in the treatment of cough and asthma. The present study was designed to evaluate the Cardioprotective activity of hydroethanolic leaf extract of *Solanum xanthocarpum* in isoproterenol induced rats. The hydroethanolic leaf extract at the concentration of 200mg/kg of body weight showed significant decrease in the levels of Total Cholesterol, Triglycerides, LDL and an increase in HDL in isoproterenol induced rats. The extract effect was compared with standard drug propranolol, which also offered similar protection. Thus, the study clearly shows that the hydroethanolic leaf extract of *Solanum xanthocarpum* possesses potent Cardioprotective activity.

INTRODUCTION

Myocardial infarction (MI) is an irreversible necrosis of tissue of a region of myocardium caused by ischemia, which is a perfusion imbalance between demand and supply of blood to the heart via the coronary circulation [1]. There is substantial evidence that ischemic tissue generates oxygen – derived free radical (oxygen radicals). Oxygen molecules containing odd number of electron, making them chemically reactive and often leading to chain reaction [2].

Recently, attention has been focused on non- nutrient phytochemicals and polyphenols such as the flavonoids, alkaloids, and xanthones derived from different plant species as potential therapeutic agents in the prevention and management of cardiovascular diseases due to their antioxidant nature [3].

Solanum xanthocarpum is commonly known as the Indian nightshade or Yellow berried nightshade plant. The common name is Kantakari. It plays an important place among medicinal herbs (especially, for the treatment of cough) in India since ancient times. The plant was found to be well versed in India, often in waste places, on roadsides and in open place [4].

The powder form of Kantakari with oils is well and used externally for alternative nasal disorders. And also, nasal administration of Kantakari is beneficial in migraine, and headache. The dried fruits are smoked in the form of cigarette and the smoke held up in the mouth cavity for some time ameliorates the dental infections. The paste applied on swollen and painful joints in arthritis, reduces the pain and swelling effectively.

The present study aims to evaluate the protective effect of *Solanum xanthocarpum* leaf extract on isoproterenol induced rats.

MATERIALS AND METHODS

Animals

Adult female Wistar rats (120 to 150g) procured from the laboratory animal house was used for the study. The ethical clearance (CPCSEA/No.316/2015/IAEC) for the handling of experimental animals was obtained from the Institutional Animal Ethics Committee (IAEC). The animals were maintained under standard laboratory conditions with controlled temperature and humidity,

where they were allowed to get acclimatized to standard laboratory diet and filtered water. They were kept at constant room temperature 37˚C, 12 hours day and night cycle. The place where the experiments were conducted was kept very hygienic.

Chemicals

Isoproterenol was purchased from Sigma chemical Co., USA. Propranolol (standard drug) was purchased from a pharmacy.

Preparation of *Solanum xanthocarpum* extract

Solanum xanthocarpum was collected from the local areas of Mettupalayam, Tamilnadu. About 1kg of the leaf of *Solanum xanthocarpum* was dried by shade drying method at room temperature and ground to coarse powder. The coarse powder of the leaf was used for the preparation of the extract. The coarse powder of *Solanum xanthocarpum* leaves was soaked in 50% ethanol and cold macerated for three days. The suspension was filtered through a fine muslin cloth. The residue was removed. The filtrate was taken in round – bottom glass flask and the sample was evaporated to dryness at a low temperature in a rotatory evaporator. When needed, the residual extracts were dissolved in distilled water and given for animal for cardioprotective study.

Induction Myocardial Infarction Using Isoproterenol

Myocardial infarction was induced by dissolving isoproterenol hydrochloride at the concentration of 85mg/kg body weight in physiological saline for the two consecutive days (29th and 30th day).

Experimental Setup

The rats were randomly divided into four groups of 3 animals in each group.

Group I : Normal rats

Group II : Rats treated with Isoproterenol 85mg/kg of body weight.

Group III : Rats treated with Isoproterenol and standard drug of Propranolol (10mg/kg body weight).

Group IV: Rats treated with *Solanum xanthocarpum* (200mg/kg body weight) given for 28 days. Isoproterenol was administrated in rats on 29th and 30th day.

At 31st day, the rats were sacrificed under the mild chloroform anesthesia. Blood was collected via heart puncture method and serum was separated by centrifugation at 4000 rpm for 20 minutes and kept at -20˚C for the estimation of TC, TG, LDL and HDL Cholesterol.

Estimation of Lipid Profiles

Total cholesterol was measured according to the method of Castelli, 1977[5]. Triglycerides were measured according to the method of Phlip and Mayne, 1994 [6]. HDL and LDL cholesterols were estimated using autospan diagnostic kits.

Statistical Analysis

Data obtained was expressed as mean ± SD. The results were obtained by using the method of distribution statistics (standard descriptive analysis) and Student 't' test using R - Statistical Computing and Graphical Tools.

RESULTS

Triglycerides, Total cholesterol, LDL were increased significantly in (Group II) depressed rats when compared with normal (Group I) rats. There was stepwise reduction in extract treated groups.

TABLE: 1. Effect of *Solanum xanthocarpum* levels of total cholesterol, HDL and LDL in serum of control and experimental rats.

GROUPS	TC	TG	HDL	LDL
Normal	177.34 ± 0.724	137.82 ± 1.21	61.29 ± 0.78	93.45 ± 2.45
Isoproterenol	266.13 ± 0.73*	227.61 ± 0.99*	27.42 ± 1.13*	151.33 ± 0.79*
Drug Treated	174.47 ± 1.22*	156.49 ± 0.77*	56.69 ± 0.77*	103.62 ± 1.20*
Plant Treated	200.66 ±1.53*	165.89 ± 1.75*	40.21 ± 1.09*	122.21 ± 1.42*

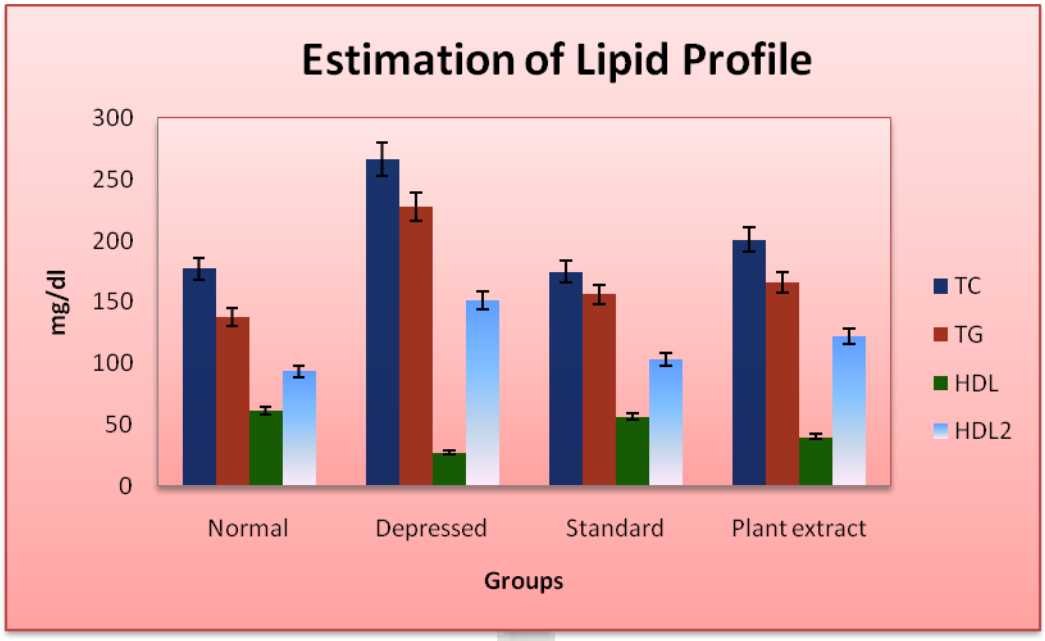

Figure 2: Effect of *Solanum xanthocarpum* levels of total cholesterol, HDL and LDL in serum of control and experimental rats

In Isoproterenol induced myocardial infarcted rats, there was a significant increase in the levels of Total Cholesterol, Triglycerides, LDL and a significant decrease in the levels of serum HDL level (Table 1). Pretreatment with hydroethanolic extract of *Solanum xanthocarpum* significantly decreased the levels of serum Total Cholesterol, Triglycerides, LDL and significantly increased the levels of HDL when compared to the normal group.

Thus *Solanum xanthocarpum* as some protective effect on myocardium against Isoproterenol.

CONCLUSION

It is clear that pretreatment with *Solanum xanthocarpum* normalized the levels of lipids and cardiac marker enzymes in ISO induced MI rats. This could be due to the antioxidant effect of *Solanum xanthocarpum*. Thus, our study clearly indicated a significant cardioprotective activity of hydroethanolic extract of *Solanum xanthocarpum.*

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