

ANTIOXIDANT ACTIVITY OF METHANOLIC EXTRACT OF *SWERTIA CORYMBOSA* (GRISEB) WIGHT EX CLARKE (GENTIANACEAE) ON ALLOXAN INDUCED DIABETIC RATS

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ABSTRACT

The term antioxidant was originally used to refer specifically to a chemical that prevented the consumption of oxygen. The present study investigates the antioxidant potential of methanolic extract of *Swertia corymbosa*. The antioxidant activity of the plant was investigated by analyzing the enzymes of lipid peroxidation like catalase, superoxide dismutase and glutathione peroxidase from the samples of alloxan induced diabetic rats. It was found that the extract exhibited significant antioxidant potentials.

KEYWORDS: *Swertia corymbosa*, Catalase, Superoxide dismutase, Glutathione peroxidase.

INTRODUCTION

Swertia corymbosa (Griseb.) Wight ex Clarke is an important indigenous medicinal plant of the family Gentianaceae. The species of Gentianaceae are known for their bitter taste, which can be related to their content of irridoids, such as amarogenetin bitterest compound known so far in the world. It is found to be used in the ayurvedic system of medicine and folk medicine. This plant is a unique source of various types of xanthone derivatives¹. Therefore, the present study is aimed at assessing antioxidant activity of methanolic extract of *Swertia corymbosa*.

In the late 19th and early 20th century, extensive study was devoted to the uses of antioxidants in the industrial processes, such as the prevention of metal corrosion, the vulcanization of rubber, and the polymerization of fuels in the fouling of internal combustion engines. Antioxidant activity could be measured simply by placing the fat in a closed container with oxygen and measuring the rate of oxygen consumption.

However, it was the identification of vitamins A, C and E as antioxidants that revolutionized the field and led to the realization of the importance of antioxidants in the biochemistry of living organisms. Initial studies suggested that antioxidant supplements might promote health, later large clinical trials did not detect any benefit and suggested instead that excess supplementation may be harmful². The action of one antioxidant may therefore depend on the proper function of other members of the antioxidant system³.

Some compounds contribute to antioxidant defense by chelating transition metals and preventing them from catalyzing the production of free radicals in the cell. Selenium and zinc are commonly referred to as antioxidant nutrients, but these elements have no antioxidant action by themselves and are instead required for the activity of some antioxidant enzymes⁴. As with the chemical antioxidants, cells are protected against oxidative stress by an interacting network of antioxidant enzymes. The contribution of these enzymes to antioxidant defenses can be hard to separate from one another, but the generation of transgenic mice lacking just one antioxidant enzyme can be informative⁵.

MATERIALS AND METHODS

Collection of Plant Material: Aerial parts and roots of *Swertia corymbosa* (Griseb.) Wight ex Clarke of Gentianaceae was collected during blooming season (November 2009) from nearby sholas of Kothagiri Hills of the Nilgiri District, the Western Ghats, Southern India, Tamilnadu. The plant was identified and authenticated by a plant taxonomist, Balasubramanian.

Experimental Induction of Diabetes in Rats: Three month old male Wistar Albino rats weighing 180-240g were obtained from the animal house of the laboratory of Agricultural University, Trissur, Kerala were used for the present study. All the rats were fed with standard rat pelleted diet (Karnataka Agro Food Corporation Limited, Bangalore, India) and water was provided *ad libitum* and maintained under controlled room condition with a 12 hr. light/ 12hr. dark cycle at 24°C- 28°C with a relative humidity of 60-70% respectively. The rats were injected with alloxan monohydrate dissolved in sterile normal saline at a dose of 150 mg/kg body weight intraperitoneally. After a fortnight, rats with marked hyperglycemia were selected and used for the study.

Experimental Design: In the experiment a total of 20 rats (15 diabetic surviving rats and 5 normal rats) were used. Diabetes was induced in rats 2 weeks before starting the treatment. The rats were divided into four groups

Group I : Rats given only saline (by using an intragastric catheter tube).

Group II : Alloxan induced diabetic rats (drug at the dose of 200mg/ kg.b.w).

Group III : Alloxan induced diabetic rats treated with glibenclamide
100mg/kg.b.w.

Group IV : Alloxan induced diabetic rats treated with plant extract of *Swertia corymbosa* at 150mg/kg.b.w body weight for 14 days

Determination of Enzyme Activity

Preparation of Tissue Extract and Collection of Blood: The control and treated rats were started for 24h and sacrificed by cervical dislocation. Liver and kidney were rapidly excised, washed with normal saline, blotted dry and weighed. Blood was collected on decapitation and serum was separated by centrifugation (for 20 min. at 2000 rpm). The serum and tissue were collected and used for biochemical parameters. The estimation of enzymes superoxide dismutase⁶, catalase⁷ and glutathione peroxidase⁸ were carried out in the control and experimental rats.

RESULTS

The antioxidant activity of the methanolic extract of *Swertia corymbosa* was analyzed by estimating the levels of catalase, glutathione peroxidase and superoxide dismutase with the normal and diabetic treated albino rats. The results obtained were represented in the table 1.

DISCUSSION

The levels of serum catalase, Superoxide dismutase and glutathione peroxide in control and experimental rats were investigated. A highly significant reduction in the activity of scavenging mitochondria enzymes is observed in alloxan induced rats. These adverse changes were reversed to near normal values in plant extract treated group IV as well as glibenclamide treated rats (Table 1).

Reactive oxygen species can themselves reduce the activities of antioxidant defense mechanism. In the present study, methanol extract of *Swertia corymbosa* has enhanced mitochondrial enzymatic antioxidant activity and suppressed lipid peroxidation. Free radicals react with lipids causing peroxidation, resulting in the release of products such as malondialdehyde, hydroperoxide and hydroxyl radicals. This extract have the capacity to scavenge free radicals directly or interfering with generation of free radicals^{9,10}. Thus, the inhibitory effects of this extract on oxidative damage may be attributed to the suppression induced peroxidation¹¹.

It is well known that CAT, SOD and GPX play an important role as protective enzymes against free radical formation in tissues¹². Several investigators have reported that the reduced activities of CAT and SOD gene were induced by free radicals and also by certain human factors. The present study indicates the reduction in the activities of SOD, CAT and GPX in alloxan induced rats (group II). The

results reveal the protective role of this extract in decreasing lipid peroxidation and by normalizing antioxidant system.

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Table 1: Effect of treatment for 14days with extract of *Swertia corymbosa* on serum catalase, superoxide and glutathione peroxide of control diabetic and diabetic treated rats

Parameter	Catalase (mM/mgHB)	Superoxide dismutase (U/g HB)	Glutathione peroxide (umol/ml)
Group I	0.151±0.016	16.52±2.39	0.163±0.014
Group II	0.102±0.031	11.34±4.31	0.104±0.013
Group III	0.143±0.043	14.98±3.14	0.129±0.016
Group IV	0.153±0.013	15.63±1.63	0.152±0.013