Antioxidant Properties Of Inula Racemosa, A Traditional Herbal Medicine

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Citation

Abstract
Introduction-The root of Inula racemosa (local name Pushkarmool) is an effective traditional herbal medicine for ischaemic heart disease, diabetes, bronchial asthma and other diseases, where oxidative stress is implicated in the pathogenesis. Objective- To evaluate the antioxidant properties of the herb.Material and methods- The effect of daily oral administration of alcoholic extract (as viscous residue/ resin suspended in 1% gum acacia) of Inula racemosa roots to rats for 21 days was investigated on lipid peroxide formation and reduced glutathione (GSH) content, two well established markers for oxidative stress status, in blood and liver. Results- The level of GSH in blood and liver was significantly higher in treated animals as compared to control. There was concomitant reduction in the rate of lipid peroxide formation in the blood from treated animals. Conclusions- These observations suggest that the root of Inula racemosa has antioxidant properties that may contribute to the therapeutic efficacy of herb in various diseases.

INTRODUCTION
The noxious consequences of oxidative stress induced by reactive oxygen species in biological systems are manifold and include oxidative damage to vital biomolecules, alterations in some physiological processes and several ailments including diabetes, cardiovascular diseases, respiratory disorders and cancer (1,2). Peroxidation of membrane lipids, has been suggested to be one of the primary mechanism of cell injury associated with various diseases and chemical toxicities (2). Reduced glutathione plays an important antioxidant role in the maintenance of sulfhydryl dependant enzymes activity and integrity of biological membranes during intracellular redox potential imbalance occurring in physiological and pathological conditions (3). These observations have prompted extensive studies towards the development of therapeutic antioxidants and elucidation of their mechanism of action.

According to a WHO estimate, 80% of the people in developing countries of the world rely on traditional medicine for their primary health care needs, and about 85% of traditional medicines involve the use of plant extracts (4). However, much less information is available regarding their active principles, detailed pharmacology and toxicology profile and mechanism of action. The root of Inula racemosa, a herb found in western Himalaya, is an effective remedy for ischemic heart disease, diabetes, bronchial asthma and other ailments (5,6) which are now shown to be associated with oxidative stress (2). The present study was designed to investigate the antioxidant properties of the herbal root extract of inula racemosa in order to understand the molecular basis of its pharmacological action against diseases.

MATERIAL AND METHODS
Root of inula racemosa were purchased from local market, dried in shade and grinded with the help of electric grinder to a fine powder. Root powder was extracted with 70% ethanol in soxhlet apparatus at 55-60°C. The alcoholic crude extract was filtered and concentrated on a waterbath under reduced pressure to obtain a thick viscous residue/resin which was further dried in a vaccum desiccator over anhydrous calcium chloride. The yield of residue thus obtained was 155 gm/kg of the dried roots.

Albino rats of either sex weighing 100-150g were maintained under standard laboratory conditions. Animals were divided into two groups of five rats each. Experimental animals received the herb resin (in 1% gum acacia) orally with the help of a feeding cannula at a dose of 60mg resin/kg for 21 consecutive days. Controls were administered only gum acacia and were run under similar experimental
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Conditions.

Animals were killed 24 hours after the last dose of plant extract and samples of blood were collected in EDTA (1mg/ml blood) for biochemical estimations. Livers were immediately removed, washed with saline and homogenized in cold buffered-KCL solution (1.15% KCL in 0.01M Tris–Hcl buffer, pH 7.4) with help of Potter-Elvehjem homogenizer.

Lipid peroxidation was measured in whole blood in terms of thiobarbituric acid reacting species (TBARS) (7) and GSH was determined in whole blood and liver homogenate using 5,5'-dithiobis-2-nitrobenzoic acid (DTNB) as described by Jollow et al (8). Statistical Analysis- Mean ± S.E. was calculated for control and treated samples separately and significance was determined by students “t’ test.

RESULTS AND DISCUSSION

Figure 1

Table 1: Effect of Inula racemosa root extract on glutathione content and lipid peroxidation in rat tissues.

<table>
<thead>
<tr>
<th>Group</th>
<th>% of initial body wt</th>
<th>% liver/body wt ratio</th>
<th>GSH (mole/mg blood or g liver)</th>
<th>Lipid peroxidation (a mole TBA/100 ml blood)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>104 ± 2.6</td>
<td>3.44 ± 0.27</td>
<td>0.216 ± 0.068</td>
<td>0.70 ± 0.320</td>
</tr>
<tr>
<td>Treated</td>
<td>92 ± 1.9</td>
<td>3.97 ± 0.19</td>
<td>0.506* ± 0.12</td>
<td>2.744* ± 0.57</td>
</tr>
</tbody>
</table>

Values are the mean±S.E. of 15 animals.

* p < 0.05

The above table (Table no. 1) shows that oral administration of alcoholic extract of Inula racemosa roots (60mg resin equivalent to 387mg root powder/kg in 1% gum acacia) given to rats for 21 consecutive days resulted in marked increase in the level of GSH in blood (4.3 fold) and liver (2.8 fold) when compared to the control peroxides formation in blood. There was concomitant reduction (3.3 fold) in the extent of lipid peroxides formation in blood. There were no marked changes in the growth rate and liver to body ratio in treated animal, which suggests that the herbal preparation is well tolerated during the treatment period and does not elicit an alteration in the liver size. This study shows that Inula has antioxidant properties because greater availability of GSH to the cell would lead to higher rate of destruction of deleterious hydrogen peroxide and lipid peroxides by glutathione peroxidase (3) and hence, protection of vital biomolecules, nucleic acids, carbohydrates, proteins and lipids against oxidative injury associated with chemical toxicity and certain diseases.

References

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