ANTISTRESS ACTIVITY OF BOERHAAVIA DIFFUSA ROOT EXTRACT AND A POLYHERBAL FORMULATION CONTAINING BOERHAAVIA DIFFUSA USING COLD RESTRAINT STRESS MODEL

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ABSTRACT

Hydroethanolic extract (80%) of Boerhaavia diffusa (HEBD) and a polyherbal formulation (Punarnava mandur) PHF-09 containing Boerhaavia diffusa were compared for their antistress activity using Cold restraint stress model. Punarnava mandur contains Boerhaavia diffusa, mandur bhasam, varun, bharangi. Stress was induced by subjecting animals to Cold restraint. Due to Cold restraint stress there was an imbalance in the levels of biochemical parameters like glucose, triglycerides, cholesterol, SGOT, SGPT which were near normalized following the administration of HEBD and PHF-09. HEBD and PHF-09 were found to have comparable antistress activity.

Keywords: HEBD, Punarnava mandur, Cold restraint stress

INTRODUCTION

In this modern era, stress has become an integral part of human life. It is vital that stress is kept under control and normal functioning is not hampered due to excessive stress. Stress is considered to be any condition which results in perturbation of the body's homeostasis. If the level of stress is extreme, the homeostatic mechanisms of the organism become deficit and the survival of the organism is threatened.

Drugs having antistress properties induce a state of non-specific functions and non-specific resistance of the body have been termed as adaptogens. Herbal formulations have been in use for many years not only in Asian countries but also globally for human well-being. The herbal formulations claimed to enhance physical endurance; mental functions and non-specific resistance of the body have been termed as adaptogens. The potential utility of safer and cheaper herbal medicines as antistress agents have been reported as they can withstand stress without altering the physiological functions of the body. Various herbs like Withania somnifera, Emblica officinalis, Asparagus racemosus, Ocimum sanctum, Tribulus terrestris and Piper longum are claimed to have immunomodulatory, adaptogenic, anabolic effects and the ability to improve vital energy.

Herbal medicines are known to act synergistically in combination. Polyherbal formulation (Punarnava mandur) PHF-09 is composed of punarnava, mandura bhasam, varun and bharangi. Boerhaavia diffusa (Family: Nyctaginaceae) is commonly known as "Punarnava" in the Indian system of medicine. The roots of Boerhaavia diffusa have been found to have anti-inflammatory, fibrinolytic and anti-coagulant activities. The plant is also reported to have adaptogenic and antistress activity.

OBJECTIVE

The main objective of present study is to establish the antistress activity of hydroethanolic extract of Boerhaavia diffusa (HEBD) and to compare its antistress potential to that of a polyherbal formulation (PHF-09).
Statistical analysis

All the values were expressed as mean ± S.E.M (n=6). Statistical evaluation of the results was carried out using Analysis of Variance (ANOVA) followed by Dunnett’s test. P values <0.05 were considered significant.

RESULTS AND DISCUSSION

The HEBD and PHF-09 showed antistress activity in dose dependent manner. Cold restraint stress resulted in significant decrease in glucose & triglyceride levels. Triglyceride level was near normalized following the administration of HEBD and PHF-09, the effect being more profound following treatment with PHF-09 at 600 mg/kg p.o. as compared to HEBD treatment. A significant increase was observed in the levels of cholesterol, SGOT, SGPT in stress control group as compared to normal control group as shown in Figures 1 and 2.

Decrease in blood glucose level was probably due to depletion of energy stores due to repeated stress. There is a close relationship between catecholamines and triglycerides. Therefore, it could be suggested that the decrease in the level of serum triglyceride is mediated via adrenal medullary secretions and through activation of sympathetic nervous system. Both catecholamines and corticosteroids have a lipolytic effect on the adipose tissue, stimulating fat mobilization and increasing circulating free fatty acids which probably results in an increase in plasma cholesterol concentration after Cold restraint stress.

Cold restraint stress resulted in significant increase in enzyme levels namely SGOT and SGPT and this pattern was reversed by HEBD and PHF-09 treatment. SGOT and SGPT are markers of hepatic functional status as they indicate parenchymal liver damage. SGOT and SGPT levels were increased in stress group possibly because of the alterations in the membrane permeability which might occur in the cells during stress. These changes also represent a functional alteration in the cell membrane due to steroidal storms, which occur during stress.13

Relative adrenal gland weight was increased due to Cold restraint stress which was near normalized following the administration of HEBD and PHF-09. Exposure to Cold restraint stress resulted in adrenal hypertrophy, indicating the active involvement of the hypothalamic-pituitary-adrenal (HPA) axis, which is highly responsive to stress. Adrenal hypertrophy takes place in response to the secretion of adrenocorticotrophic hormone (ACTH) from the pituitary due to increased corticosterone levels from cortical cells to combat stress as shown in Table 1. Both HEBD and PHF-09 exhibited comparable antistress activity.

Phytochemical constituents like flavonoids, alkaloids, glycosides and sterols have been reported to be present in the alcoholic root extracts of Boerhaavia diffusa. The antistress activity of Boerhaavia diffusa is mainly attributed to these constituents with established antioxidant activity.10

### Table 1: Antistress activity of hydroethanolic extract of *Boerhaavia diffusa* and polyherbal formulation (PHF-09) on relative adrenal gland weights in Cold restraint stress model

<table>
<thead>
<tr>
<th>Groups/Parameter</th>
<th>Normal group</th>
<th>Stress group</th>
<th>Standard (Diazepam 2mg/kg) 300mg/kg</th>
<th>Punarnava extract 300mg/kg</th>
<th>Polyherbal formulation Polyherbal 3000mg/kg</th>
<th>Polyherbal 6000mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Adrenal gland weight=</td>
<td>0.0001011 ± 0.0000216</td>
<td>0.001987 ± 0.0000069</td>
<td>0.001385 ± 0.000001721**</td>
<td>0.001116 ± 0.000007215*</td>
<td>0.001115 ± 0.00001485*</td>
<td>0.001295 ± 0.00001689*</td>
</tr>
<tr>
<td>All values expressed as Mean ± SEM, n = 5; One-way ANOVA followed by Dunnett’s test is applied for statistical analysis, All treated groups were compared with stress group.</td>
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Fig. 1: Antistress activity of hydroethanolic extract of *Boerhaavia diffusa* and polyherbal formulation (PHF-09) in Cold restraint stress model
Fig. 2: Antistress activity of hydroethanolic extract of *Boerhaavia diffusa* and polyherbal formulation (PHF-09) in Cold restraint stress model

All values expressed as Mean ± SEM, n = 6;
One-way ANOVA followed by Dunnett's test is applied for statistical analysis,
All treated groups were compared with stress group.
* Significant at p < 0.01, ** Significant at p < 0.05
Stress control group was compared with normal control group at * p<0.01.

REFERENCES


