Glycyrrhiza glabra versus Boswellia carterii in chronic bronchial asthma: A comparative study of efficacy

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ABSTRACT

Bronchial asthma is a clinical syndrome with variable causes. It characterizes by episodes of broncho-constriction which leads to shortness of breath. In traditional medicine, some medicinal plants have been used to cure the asthmatic symptoms. We evaluate the bronchorelaxant effect of Boswellia carterii (Olibanum) and Glycyrrhiza glabra (Licorice) then to choose the better. 54 patients with chronic bronchial asthma were participated. After clinical assessment, estimation of pulmonary function tests and serum electrolytes: calcium, magnesium, potassium and selenium were done before and after the study. Boswellia carterii was given to 18 patients and glycyrrhiza glabra to another 18 patients while prednisolone was given to another 18 patients as control for 21 days. The results showed that the tested plants had significant elevation in the values of forced expiratory volume in first second (FEV1%) as (72.45±5.83 vs 61.33±6.04 and 81.10±11.07 vs 62.30±7.22) for olibanum and licorice respectively. Also, elevation in the values of forced volume capacity (FVC) with marked reduction in asthmatic attacks as (2.63±0.82 vs 0.72±0.16, 3.60±0.02 vs 1.08±0.08, and 2.25±0.16 vs 1.05± 0.15) for olibanum licorice and prednisolone respectively, but showed better symptomatic improvement with licorice as compared to olibanum. The results prove the superiority of glycyrrhiza glabra over boswellia carterii for chronic bronchial asthma.

Key words: Licorice, olibanum, pulmonary function tests, selenium

INTRODUCTION

Bronchial asthma is an inflammatory syndrome characterized by paroxysmal or recurrent episodes of bronchial obstruction causing shortness of breath, cough, chest tightness, wheezing and rapid respiratory rate.[1] Many factors are involved like air pollutants, mold species,[2] emotional factors,[2] obesity[3] and some medications as β-blockers and non-steroidal anti-inflammatory drugs.[4] Although the pathogenesis of chronic bronchial asthma (CBA) is complex, reactive oxygen species (ROS) have been shown to be directly associated with asthma pathogenesis and an oxidant-antioxidant imbalance.[5] ROS evoke bronchial hyperactivity through releasing both histamine from the mast cells and mucus from airway epithelial cells.[6]

G. glabra (Licorice), is a herbaceous perennial, with purple to whitish blue flowers and is native to the Mediterranean and
certain areas of Asia. It contains: glycosides, flavonoids, glycyrrhizin (the main active component), glycyrrhizic acid (has anti-viral effect), saponins, phytoestrogens, starches (30%) and volatile oil with yellow coloring matter. B. carterii (Olibanum), is one of the oldest aromatic materials used by mankind, obtained from resin of trees of Burseraceae family. It is mainly used in traditional Chinese medicine to alleviate pain and inflammation. [31] It contains β-boswellic acid (the main active constituent that blocks cancer cell growth), α-terpenoids, sugars, and volatile oils.

The relative absence of data in this domain is an incentive to evaluate the potential smooth muscle relaxation effect of these two medicinal plants in CBA.

MATERIALS AND METHODS

Plant material
The test medicinal plants were purchased from a well-known bureau for herbs (Al-Medina) in Baghdad and were identified and authenticated by Iraqi National center for Herbs. The plants were cleaned, dried, and powdered with an electrical grinder, and then passed through sieve no. 40 to remove the debris. The sieved powder was stored in airtight container at room temperature. Licorice needs covering with boiling water for 15 minutes while olibanum needs soaking in water for 12 hours for use.

Subjects
Fifty four patients of CBA, 31 males and 23 females, aged from 27-55 years (mean 41.66±0.3 SD), participated in this randomized, open, and comparative clinical study. The participants were recruited from the outpatient clinic of Department of Medicine of Al-Kadhemiya Teaching Hospital from August 2009 to June 2010 excluding pregnant women, cigarette smokers, alcohol consumers and any disease other than chronic asthma. The trial was explained to all subjects and their consent was obtained.

Experimental protocol
Approval to conduct this study was granted by the ethical committee in College of Medicine/Al-Nahrain University (Registration No.HEC/41/09/CMANU). The patients were advised to stop medication and prevent any exercise or exposure to any allergen at least 24hrs prior to test. They were randomly allocated to three groups of 18 patients each and received oral daily dose of the following for three weeks

<table>
<thead>
<tr>
<th>Groups</th>
<th>Before usage</th>
<th>After usage</th>
<th>Before usage</th>
<th>After usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Prednisolone/ positive control)</td>
<td>72.75± 0.9</td>
<td>76.83± 3.34*</td>
<td>1.05 ± 0.15</td>
<td>2.25 ± 0.16*</td>
</tr>
<tr>
<td>II (Boswellia carterii-received)</td>
<td>61.33± 6.04</td>
<td>72.45± 5.83*</td>
<td>0.72 ± 0.16</td>
<td>2.63 ± 0.82*</td>
</tr>
<tr>
<td>III (Glycyrrhiza glabra-received)</td>
<td>62.30± 7.22</td>
<td>81.10± 11.07*</td>
<td>1.08 ± 0.08</td>
<td>3.60 ± 0.02*</td>
</tr>
</tbody>
</table>

Values are mean ± SEM, n=18 patients for each group, *P<0.05 compared with before treatment

RESULTS

The results revealed significant elevation in FEV, % of olibanum and licorice as (72.45± 5.83 vs. 61.33± 6.04, and 81.10± 11.07 vs. 62.30± 7.22) respectively. Also, significant elevation was showed in FVC/L of olibanum and licorice in addition to prednisolone as (2.63± 0.82 vs. 0.72± 0.16, 3.60± 0.02 vs. 1.05± 0.15, and 2.25± 0.16 vs. 1.05± 0.15) respectively, but with superiority to licorice [Table 1]. Elevations in serum electrolyte levels were also significantly confirmed the above obtained results [Table 2].

DISCUSSION

Bronchial asthma is an inflammatory condition with episodes of bronchial muscle contraction resulted from releasing of leukotrienes (LTs). Prednisolone which is used in group I, produces bronchial muscle relaxation indirectly through inhibiting the release of LTs and reversing mucosal edema. [11] In group II with olibanum, The pentacyclic triterpenic acids like α-acids (potent anti-inflammatory substances of boswellia gum resin extract) inhibit polymorphonuclear leukocyte
infiltration (the prominent cells of inflammation),[12] and inhibit the human leukocyte elastase, which is involved in the pathogenesis of chronic bronchitis, emphysema, and acute respiratory distress syndrome.[13] Also, acetyl-11-keto-beta-boswellic acid of boswellia has been identified to prevent the release of LTB4 which are potent inducers of bronchoconstriction.[14] In group III, licorice has similar effect as prednisolone but more potent. This is because glycyrrhizin (the active ingredient) has corticosteroid like activity, while the antispasmodic effect is related to the flavonoids present in the plant.[15] Changes of serum electrolytes levels in asthmatic patients showed positive correlation between serum Se+2 and Mg+2 levels and each FEV1% and FVC. Our results agreed with a study showed that if serum Se+2 and Mg+2 levels decreased the possible risk of asthma would be increase due to reduction in glutathione peroxide and antioxidiant activity and vice versa.[16] Most of the asthmatic patients recorded low levels of serum Ca+2 before treatment and this is due to increased intracellular Ca+2 in leukocytes that directly correlated with severity of asthma.[17]

CONCLUSION

Glycyrrhiza glabra and boswellia carterii can be used in prophylaxis and relieving the symptoms of CBA due to their efficacy but with the superiority of glycyrrhiza glabra.

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