Effect of *Hibiscus sabdariffa* and tea extract on cellular immunity in lab animals

تأثیر نبات الكجرات والشاي في المناعة الخلوية في الحيوان المختبري

Abstract

In this study, the effect of aqueous extract of *Hibiscus sabdariffa* calyces, black and green tea leaves were studied in lab animals. Cellular immunity which represented by the phagocytes as in the reduction of NBT dye and skin DTH test. *Hibiscus* extract was showed higher significant NBT reduction in $P \geq 0.05$ compare with tea extract and control where's there three plants were stimulated cellular immunity in skin DTH test demonstrated by signs of reaction such as redness, thickness, necrotic, indurations and erythma after 24-72 hr.

Introduction

In the last years there has been significant increase in the use of natural products in health care and there potential application in agriculture, pharmaceutical and food industry are being investigated (Gomez et al., 2008). In fact about 30% of drugs industrialized countries are derived from plants (Kanfman et al., 1999). Plants play an essential role in the health care needs not only for treatment disease, but also to improve the immunological response against many pathologies. *Hibiscus sabdariffa* is the member of the family malvaceae, was used for different uses as vegetables, some of oils, refreshing drink and food preserves (Fasoyira et al., 2005). The calyces have been found to be rich in vitamin c and other antioxidants such as flavonoids and also minerals (Wong et al., 2002; Babalola et al., 2001). Fruits are also rich sources of vitamins and antioxidants, which are essential as health food in the building up of body immune system and preventing disease (CAT, 2001). The tea plant *Camellia sinesis*, family is theaceae is a perennial evergreen plant that is semi tree or shrub depending on the environment. Green and black tea are processed differently during manufacturing. Green tea is non oxidized where's black tea is fully oxidized. Caffeine the most content of black tea where's catechins in green tea is the most important. The effect of plants are multiple from antitumor, antimicrobial, antimitagenis and immune system immunomodulatory (Chan et al., 2006; Roberts et al., 2005; Charles et al., 2007; DellAlca, 2004).

Materials and Methods

**Plant extracts** 1gm of tea leaves and *Hibiscus* calyces with 10 ml of boiling distal water for 1hr at water bath. Aqueous extract were then filtered and cooled at room temperature (Charles et al., 2007).
**Animals** Healthy New Zealand rabbit (*Oryctolagus cuniculus*) about 1-15 kg. were used as experimental animals. They were kept at room temperature in a labium condition during the experimental period.

**Immunization program**

Animals were divided into 4 groups, with 5 animals per group. Three groups were given 5 ml of plant extracts orally, and 5 animals were given 5 ml of distilled water as normal control daily for three weeks. At the beginning of the fifth week, animals were heart-punctured for blood. Blood was saved with anticoagulant for cellular test (Al-Thahab, 2006).

**Cellular immune procedures:**

Nitroblue tetrazolium was done according to (Park *et al.*, 1968). Skin DTH test was done as in (Tompkins *et al.*, 1973).

**Statistical analysis**

Statistical analysis was done depending on (Dawed and AL-Yas, 1990).

**Results**

The ability of three plants' extracts was varied in $P \leq 0.05$. *Hibiscus* extract showed a higher effect in phagocyte reduction NBT process compared with tea extract and control. Tea extract was rarely less effective, Table (1). In effect of three plants on skin DTH test, there were stimulate T cells showed clearly in tuberculin like mild reaction were noted as redness, erythema, indurations, necrotic, Table (2).

**Discussion**

Natural products play an important role in the field of new drugs research and development (Jin Ming *et al.*, 2003). Knowledge of plant biologically active compound and their mechanism of action are desirable not only for the discovery of novel therapeutic agents that would validate folkloric remedies, but also for the design of new active molecules or modification of current drugs against divers maladies. One of important application areas is immunotherapy. Plants have been shown to modulate the immune system (Spelman *et al.*, 2006; Cooper, 2007). In this study the effect of *Hibiscus* extract on phagocytes process and delayed type hypersensitivity as in skin test was clearly. Many researches that proved the plant was induce apoptosis in human leukemia cells and inductive effect on tumor promotion in mouse skin and in human leukemia. Seeds of this plant when breasting in the first six months of life stimulates immune system and protects them from diarrhea and acute respiratory infection (UNICEF, 2006; Okasha *et al.*, 2008). Anthocyanin, flavonoids, glycosides, protocatechuic acid, vitamin c and other substances which are antioxidant so there are improve immune system. Green and black tea are posses some contents that share in effects on immune system. Researches improved tea plant is protect against several forms of cancer, cardiovascular disease and microbial infection. Immunomodulatory properties was show in human peripheral blood mononuclear cell (Charles *et al.*, 2007). Caffeine, polyphenol, saponin, tannin, glycosides in black tea and catechins in green tea that share in effect on immune system varies in stimulatory or suppressor. So in this study we investigated the effect of complementary and alternative medicine plants such as *Hibiscus sabdrossfira* and...
black and green tea may be immunomodulatory and found that black tea had more effect on T cell compared with others. (Kamath et al., 2003; Hamant and Yassen, 2007; Chan et al., 2006).

Table (1): The effect of plants extract on phagocytes process in rabbits

<table>
<thead>
<tr>
<th>Plant extracts</th>
<th>Mean ± Standard deviations</th>
<th>P ≥.05</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hibiscus sabdraffira</em></td>
<td>.4240 ± 6.542</td>
<td>.000</td>
</tr>
<tr>
<td>Black tea</td>
<td>.3600 ± 9.798</td>
<td>.001</td>
</tr>
<tr>
<td>Green tea</td>
<td>.3580 ± 5.070</td>
<td>.000</td>
</tr>
<tr>
<td>Control</td>
<td>.3800 ± 9.899</td>
<td>.001</td>
</tr>
</tbody>
</table>

Table (2): Skin DTH test in rabbits

<table>
<thead>
<tr>
<th>Plants extract</th>
<th>Redness</th>
<th>Necrotic</th>
<th>Skin DTH indurations(cm) (24 hours)</th>
<th>Skin DTH indurations(cm) (48 hours)</th>
<th>Skin DTH indurations(cm) (72 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>H. sabdraffira</em></td>
<td>+</td>
<td>+</td>
<td>.5</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>Black tea</td>
<td>+</td>
<td>+</td>
<td>.8</td>
<td>.9</td>
<td>.8</td>
</tr>
<tr>
<td>Green tea</td>
<td>+</td>
<td>+</td>
<td>.5</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

+ : positive effect    - : negative effect

References


Cooper ,E. L. ;(2007). The immune system and complemantary and medicine CAM 4(S1):5-8


Dell'Aica ,J ;Dona,m; Tonello ,f. ;Piris ,a. ; Mok ,M.;(2004) .Potent inhibitors of anthrax lethal factor from green tea .EMBO reports V5(4).


